

# Quality of Surface Waters of the United States 1964

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

---

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1955

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



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**UNITED STATES DEPARTMENT OF THE INTERIOR**

**WALTER J. HICKEL, *Secretary***

**GEOLOGICAL SURVEY**

**William T. Pecora, *Director***

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## PREFACE

This report was prepared by the Geological Survey in co-operation with the States of Alabama, Georgia, Illinois, Indiana, Kentucky, Maryland, Michigan, Minnesota, New York, North Carolina, Ohio, Pennsylvania, Tennessee, West Virginia, and with other agencies, by personnel of the Water Resources Division, E. L. Hendricks, chief hydrologist, G. W. Whetstone, assistant chief for Reports and Data Processing, under the general direction of S. M. Lang, chief, Reports Section, and B. A. Anderson, chief, Data Reports Unit.

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# CONTENTS

	Page
Preface.....	III
List of water-quality stations, in downstream order, for which records are published....	VII
Introduction.....	1
Collection and examination of samples.....	3
Chemical quality.....	4
Temperature.....	5
Sediment.....	5
Expression of results.....	7
Composition of surface waters.....	10
Mineral constituents in solution.....	10
Silica.....	10
Aluminum.....	11
Iron.....	11
Manganese.....	11
Calcium.....	11
Magnesium.....	12
Strontium.....	12
Sodium and potassium.....	12
Lithium.....	12
Bicarbonate, carbonate and hydroxide.....	13
Sulfate.....	13
Chloride.....	13
Fluoride.....	14
Nitrate.....	14
Phosphate.....	14
Boron.....	15
Dissolved solids.....	15
Chromium.....	15
Nickel and cobalt.....	16
Copper.....	16
Lead.....	16
Zinc.....	17
Barium.....	17
Bromide.....	18
Iodide.....	18
Properties and characteristics of water.....	18
Hardness.....	18
Acidity.....	19
Sodium adsorption ratio.....	19
Specific conductance.....	20
Hydrogen-ion concentration.....	20
Color.....	21
Oxygen consumed.....	21

Composition of surface waters--Continued	
Properties and characteristics of water--	
Continued	Page
Dissolved oxygen.....	22
Biochemical oxygen demand.....	22
Chemical oxygen demand.....	22
Temperature.....	23
Turbidity.....	24
Sediment.....	24
Streamflow.....	25
Publications.....	26
Cooperation.....	28
Division of work.....	28
Literature cited.....	34
Index.....	437

## ILLUSTRATION

	Page
Figure 1.--Map of the United States showing basins covered by the six water-supply papers on quality of surface waters in 1964.	2

# WATER-QUALITY STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED

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

	Page
PART 3. OHIO RIVER BASIN.....	36
Allegheny River at Warren, Pa. (main stem) ct.	36
French Creek basin.....	39
French Creek at Utica, Pa. c.....	39
Clarion River basin.....	40
Clarion River at Cooksburg, Pa. c.....	40
Allegheny River at Kittanning, Pa. (main stem) ct.....	41
Kiskiminetas River basin.....	43
Conemaugh River at Seward, Pa. ct.....	43
Kiskiminetas River at Leechburg (Vander- grift), Pa. ct.....	46
Allegheny River at Oakmont, Pa. (main stem) ct	49
Monongahela River basin.....	52
Tygart River at Elkins, W.Va. t.....	52
Shavers Fork at Parsons, W.Va. ct.....	53
Cheat River at Lake Lynn, Pa. t.....	54
Monongahela River at Charleroi, Pa. ct.....	55
Youghiogheny River at Friendsville, Md. t...	58
Ohio River at South Heights, Pa. (main stem) ct.....	59
Beaver River basin.....	62
Mahoning River at Leavittsburg, Ohio ct.....	62
Mahoning River at Lowellville, Ohio ct.....	64
Beaver River at Beaver Falls, Pa. ct.....	68
Ohio River at East Liverpool, Ohio (main stem) ct.....	71
Muskingum River basin.....	74
Tuscarawas River at Newcomerstown, Ohio ct..	74
Killbuck Creek at Killbuck, Ohio ts.....	80
Salt Fork at mouth, near Cambridge, Ohio c..	84
Muskingum River at Dresden, Ohio cts.....	85
Licking River near Newark, Ohio ct.....	88
Licking River below Dillon Dam, near Dillon Falls, Ohio t.....	90
Muskingum River near Beverly, Ohio ct.....	91
Hocking River basin.....	94
Hocking River at Athens, Ohio cts.....	94
Kanawha River basin.....	100
New River at Glenlyn, Va. t.....	100
New River at Bluestone Dam, W.Va. t.....	101
Knapp Creek at Marlinton, W.Va. t.....	102
Kanawha River at Kanawha Falls, W.Va. t.....	103

# VIII WATER-QUALITY STATIONS, IN DOWNSTREAM ORDER

## OHIO RIVER BASIN--Continued

Kanawha River basin--Continued	Page
Kanawha River at Cabin Creek, W.Va. t.....	104
Elk River at Sutton, W.Va. t.....	105
Elk River near Frametown, W.Va. t.....	106
Elk River at Clay, W.Va. t.....	107
Elk River at Queen Shoals, W.Va. t.....	108
Kanawha River at Charleston, W.Va. t.....	109
Kanawha River at Winfield Dam, at Winfield, W.Va. ct.....	110
Ohio River near Huntington, W.Va. (main stem) ct.....	113
Big Sandy River basin.....	116
Russell Fork at Elkhorn City, Ky. t.....	116
Johns Creek near Van Lear, Ky. t.....	117
Levisa Fork at Paintsville, Ky. ts.....	118
Tug Fork at Kermit, W.Va. t.....	121
Tygarts Creek basin.....	122
Tygarts Creek near Greenup, Ky. ts.....	122
Scioto River basin.....	125
Olentangy River near Worthington, Ohio t....	125
Alum Creek at Columbus, Ohio ts.....	127
Scioto River at Chillicothe, Ohio t.....	131
Scioto River at Higby, Ohio ts.....	132
Scioto River at Lucasville, Ohio ct.....	136
Upper Twin Creek basin.....	139
Upper Twin Creek at McGaw, Ohio cts.....	139
Licking River basin.....	142
Licking River at Farmers, Ky. ts.....	142
Licking River at McKinneysburg, Ky. cts.....	147
South Fork Licking River at Cynthiana, Ky. t	153
Great Miami River basin.....	154
Stillwater River at Pleasant Hill, Ohio s...	154
Great Miami River at Miamisburg, Ohio t.....	158
Great Miami River near Miamisburg, Ohio ct..	159
Great Miami River at Middletown, Ohio c....	163
Great Miami River near Middletown, Ohio c...	165
Great Miami River at Hamilton, Ohio t.....	167
Great Miami River near Hamilton, Ohio c.....	168
Great Miami River at Elizabethtown, Ohio ct..	170
Ohio River at Markland Dam, near Warsaw, Ky. (main stem) ct.....	172
Kentucky River basin.....	175
North Fork Kentucky River at Hazard, Ky. ct..	175
Dix River at Dix Dam, near Burgin, Ky. c....	178
Kentucky River at lock 4, at Frankfort, Ky. cts.....	180
Eagle Creek at Glencoe, Ky. ts.....	185
Salt River basin.....	190
Rolling Fork near Boston, Ky. t.....	190
Green River basin.....	191
Green River near Campbellsville, Ky. t.....	191
Green River near Greensburg, Ky. c.....	192
Little Barren River near Monroe, Ky. c.....	193
Green River at Munfordville, Ky. cts.....	194



## OHIO RIVER BASIN--Continued

Green River basin--Continued	Page
Green River at Mammoth Cave, Ky. c.....	202
Wet Prong Buffalo Creek near Mammoth Cave, Ky. s.....	204
Nolin River at Kyrock, Ky. t.....	205
Barren River near Finney, Ky. t.....	207
Barren River at Bowling Green, Ky. t.....	208
Green River at lock 4, at Woodbury, Ky. t...	209
Rough River at Rough River Dam, near Falls of Rough, Ky. t.....	210
Rough River at Dundee, Ky. t.....	211
Wabash River basin.....	212
Wabash River at Huntington, Ind. t.....	212
Wabash River at Lafayette, Ind. t.....	213
Big Raccoon Creek near Fincastle, Ind. s....	214
Wabash River near Sullivan, Ind. ct.....	225
Wabash River at Riverton, Ind. t.....	228
White River near Noblesville, Ind. t.....	229
White River at Noblesville, Ind. t.....	231
White River near Nora, Ind. t.....	232
East Fork White River at Seymour, Ind. ts...	233
Tradewater River basin.....	235
Tradewater River at Olney, Ky. cts.....	235
Cumberland River basin.....	241
Cumberland River at Barbourville, Ky. t....	241
Cane Branch near Parkers Lake, Ky. cs.....	242
Cumberland River near Burkesville, Ky. t....	247
Cumberland River at Smithland, Ky. t.....	248
Tennessee River basin.....	249
French Broad River at Rosman, N.C. c.....	249
French Broad River at Blantyre, N.C. c.....	250
French Broad River at Bent Creek, N.C. c....	251
French Broad River at Ashville, N.C. c.....	252
French Broad River at Marshall, N.C. ct.....	253
French Broad River at Hot Springs, N.C. c...	256
Pigeon River at Canton, N.C. c.....	257
Pigeon River near Hepco, N.C. c.....	258
Cataloochee Creek near Cataloochee, N.C. ct.	259
Pigeon River at Waterville, N.C. c.....	261
South Toe River near Celo, N.C. ct.....	262
Doe River at Elizabethton, Tenn. t.....	264
Reedy Creek at Orebank, Tenn. c.....	265
Little River above Townsend, Tenn. t.....	266
Tuckasegee River at Dillsboro, N.C. c.....	267
Tuckasegee River at Bryson, N.C. c.....	268
Little Tennessee River below Chilhowee Dam, Tenn. t.....	269
Tellico River at Tellico Plains, Tenn. t....	270
Clinch River above Tazewell, Tenn. t.....	271
Powell River near Jonesville, Va. t.....	272
Powell River near Arthur, Tenn. t.....	273
Poplar Creek near Oak Ridge, Tenn. t.....	274
East Fork Poplar Creek near Oak Ridge, Tenn. t.....	275

## OHIO RIVER BASIN--Continued

Tennessee River basin--Continued	Page
Bear Creek near Oak Ridge, Tenn. t.....	276
Valley River at Tomotla, N.C. ct.....	277
Sequatchie River near Whitwell, Tenn. t.....	279
Elk River at Estill Springs, Tenn. t.....	280
Elk River above Fayetteville, Tenn. t.....	281
Elk River near Prospect, Tenn. t.....	282
Cedar Creek near Pleasant Site, Ala. t.....	283
Little Bear Creek near Halltown, Ala. t.....	285
Bear Creek at Bishop, Ala. t.....	286
Duck River near Shelbyville, Tenn. t.....	288
Piney River at Vernon, Tenn. t.....	289
Duck River above Hurricane Mills, Tenn. t...	290
Buffalo River near Flat Woods, Tenn. t.....	291
Buffalo River near Lobelville, Tenn. t.....	292
Ohio River at Metropolis, Ill. (main stem) t..	293
Ohio River at lock and dam 53, near Grand	
Chain, Ill. (main stem) ct.....	294
Miscellaneous analyses of streams in Ohio	
River basin cs.....	297

PART 4 ST. LAWRENCE RIVER BASIN.....	315
Streams tributary to Lake Superior.....	315
Partridge River near Aurora, Minn. c.....	315
St. Louis River near Aurora, Minn. c.....	316
St. Louis River at Scanlon, Minn. c.....	317
Black River near Bessemer, Mich. t.....	318
Streams tributary to Lake Michigan.....	319
Black River near Garnet, Mich. t.....	319
Black River near Republic, Mich. ts.....	320
Middle Branch Escanaba River near Ishpeming,	
Mich. t.....	321
Schweitzer Creek near Palmer, Mich. t.....	323
East Branch Escanaba River at Gwinn, Mich. t	324
Ford River near Hyde, Mich. t.....	326
Peshokee River near Champion, Mich. t.....	327
Popple River near Fence, Wis. t.....	328
Sturgeon River near Foster City, Mich. t....	329
Grand River near Eaton Rapids, Mich. t.....	330
Grand River at Lansing, Mich. t.....	331
Grand River at Portland, Mich. t.....	332
Muskegon River at Evart, Mich. t.....	333
Manistee River near Grayling, Mich. t.....	334
Little Manistee River near Mayfield, Mich. t	335
Boardman River near Mayfield, Mich. t.....	336
Sturgeon River near Wolverine, Mich. t.....	337
Pigeon River near Vanderbilt, Mich. t.....	338
Au Sable River at Grayling, Mich. t.....	339
Au Sable River at Mio, Mich. t.....	340
East Branch Au Gres River at McIvor, Mich. t	341
Houghton Creek near Lupton, Mich. t.....	342
Rifle River near Lupton, Mich. t.....	343
Prior Creek near Selkirk, Mich. t.....	344
Rifle River at Selkirk, Mich. t.....	345
Shiawassee River at Byron, Mich. t.....	346

ST. LAWRENCE RIVER BASIN--Continued	Page
Streams tributary to Lake St. Clair.....	347
Clinton River near Drayton Plains, Mich. t...	347
Streams tributary to Lake Erie.....	348
St. Marys River near Fort Wayne, Ind. s.....	348
Maumee River at Waterville, Ohio cts.....	349
Maumee River at Craig Bridge, at Toledo, Ohio c.....	350
Maumee River at Toledo Overseas Terminal dock, at Toledo, Ohio c.....	352
Maumee River at Center C and O Railroad dock, at Toledo, Ohio c.....	353
Maumee River at buoy 31, at Toledo, Ohio c.	354
Sandusky River near Fremont, Ohio ct.....	352
Huron River at Milan, Ohio t.....	356
Black River at Elyria, Ohio ct.....	397
Cuyahoga River at Independence, Ohio ts.....	400
Cuyahoga River at Cleveland, Ohio ct.....	403
Grand River at Painesville, Ohio ct.....	407
Streams tributary to Lake Ontario.....	411
Van Campen Creek at Friendship, N.Y. ct.....	411
Canaseraga Creek near Canaseraga, N.Y. ct...	412
Genesee River at Driving Park Avenue, Rochester, N.Y. t.....	413
Seneca River at Baldwinsville, N.Y. t.....	414
Independence River at Donnattsburg, N.Y. t...	415
Beaver River at Moshier Falls, N.Y. t.....	416
Black River at Watertown, N.Y. t.....	417
St. Lawrence River at Alexandria Bay, N.Y. (main stem) t.....	418
Miscellaneous analyses of streams in St. Law- rence River basin cs.....	419

# QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1964

## 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 record of chemical analysis, suspended sediment, and temperature of surface waters given in this volume serve as a basis for determining the suitability of waters for various uses. The flow and water quality of a stream are related to variations in rainfall and other forms of precipitation. In general, lower concentrations of dissolved solids may be expected during periods of high flow than during periods of low flow. Conversely, the suspended solids in some streams may change materially with relatively small variations in flow, whereas for other streams the quality of the water may remain relatively uniform throughout large ranges in discharge.

The Geological Survey has published annual records of chemical quality, suspended sediment, and water temperature since 1941. 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. From 1950 to 1958, the records were published in four volumes and from 1959 to 1963 in five volumes. Beginning with the 1964 water year, water quality records obtained by the Geological Survey were published in a new series of annual releases on a state-boundary basis. These records are then published in six volumes in the Geological Survey water-supply paper series. The drainage basins covered in the six volumes are shown in Figure 1. The data given in this report were collected during the water year October 1, 1963 to September 30, 1964. The records are

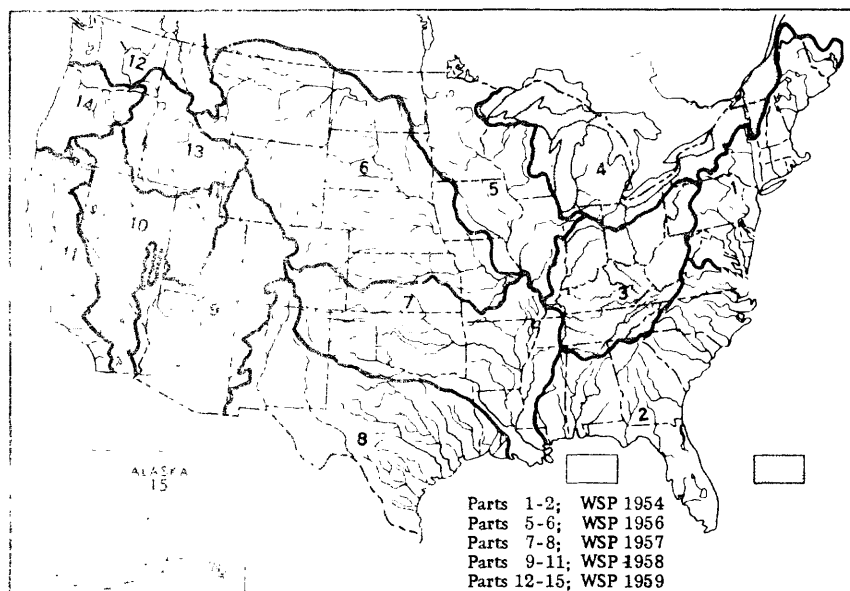


Figure 1.--Map of the United States showing basins covered by the six water-supply papers on quality of surface waters in 1964. The shaded part represents the section of the country covered by this volume; the unshaded part represents the section of the country covered by other water-supply papers.

by listing the basins in downstream order according to the order of survey needed of reporting streamflow. Stations on tributaries are listed between stations on the main stem in order in which those tributaries enter the main stem.

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 2 digits followed by a hyphen and a 6-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 location of the station in the standard downstream order within each of the 15 parts (Fig. 1). 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 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, 1964, the Geological Survey maintained 180 stations on 116 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 70 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 97 and daily at 48 stations. All surface water samples collected and analyzed during the year have not been included. Single analyses made of 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 28.

Quantities of suspended sediment are reported for 22 stations during the year ending September 30, 1964. 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 18 of the stations.

## COLLECTION AND EXAMINATION OF SAMPLES

Quality of water stations usually are located at or near points on streams where streamflow is measured by the U.S. Geological Survey. 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 concentration for the section.

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 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 the method of 10-day periods or the equivalent of three composite samples per month generally is practiced, modifications usually are 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 in order that the data would be relatively unaffected by diurnal variations in temperature. Most large streams have a small diurnal variation in water temperature; small, 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  $0.5^{\circ}\text{F}$ .

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 depth-integrating cable-suspended samples (U.S. Inter-Agency, 1963, and 1952.) from a fixed sampling point at one vertical in the cross section. A 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 a 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 before and after 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 an 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. Inter-Agency, 1957). The fine fractions were classified by the pipet method (Kilmer and Alexander, 1949) or the bottom withdrawal tube method (U.S. Inter-Agency, 1943).

## EXPRESSION OF RESULTS

The quantities of solute concentrations analyzed in the laboratory are measured by weight-volume units (milligrams per liter) and for reporting, are converted to weight-weight units (parts per million). For most waters, this conversion is made by assuming that the liter of water sample weighs 1 kilogram; and thus milligrams per liter are equivalent to parts per million (ppm).

Equivalents per million are not reported, but they can be calculated easily from the parts per million data. 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 reciprocals 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	Multi- ply by	Ion	Multi- ply by
Aluminum ( $\text{Al}^{+3}$ ).....	0.11119	Iron ( $\text{Fe}^{+3}$ ).....	0.05372
Barium ( $\text{Ba}^{+2}$ ).....	.01456	Lead ( $\text{Pb}^{+2}$ ).....	.00965
Bicarbonate ( $\text{HCO}_3^{-1}$ ).....	.01639	Lithium ( $\text{Li}^{+1}$ ).....	.14411
Bromide ( $\text{Br}^{-1}$ ).....	.01251	Magnesium ( $\text{Mg}^{+2}$ )...	.08226
Calcium ( $\text{Ca}^{+2}$ ).....	.04990	Manganese ( $\text{Mn}^{+2}$ )....	.03640
Carbonate ( $\text{CO}_3^{-2}$ ).....	.03333	Nickel ( $\text{Ni}^{+2}$ ).....	.03406
Chloride ( $\text{Cl}^{-2}$ ).....	.02821	Nitrate ( $\text{NO}_3^{-1}$ ).....	.01613
Chromium ( $\text{Cr}^{+6}$ ).....	.11539	Nitrite ( $\text{NO}_2^{-1}$ ).....	.02174
Cobalt ( $\text{Co}^{+2}$ ).....	.03394	Phosphate ( $\text{PO}_4^{-3}$ )....	.03159
Copper ( $\text{Cu}^{+2}$ ).....	.03148	Potassium ( $\text{K}^{+1}$ ).....	.02557
Fluoride ( $\text{F}^{-1}$ ).....	.05264	Sodium ( $\text{Na}^{+1}$ ).....	.04350
Hydrogen ( $\text{H}^{+1}$ ).....	.99209	Strontium ( $\text{Sr}^{+2}$ ).....	.02283
Hydroxide ( $\text{OH}^{-1}$ ).....	.05880	Sulfate ( $\text{SO}_4^{-2}$ ).....	.02082
Iodide ( $\text{I}^{-1}$ ).....	.00788	Zinc ( $\text{Zn}^{+2}$ ).....	.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 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. 25) and the temperature in degrees Fahrenheit. Color is expressed in units of the platinum-cobalt scale proposed by Hazen (1892). 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.

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. 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. For most streams, discharge-weighted averages are lower than arithmetical averages because at times of high discharge the rivers generally have low 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 concentrations in parts per million by the daily mean discharge in cubic feet per second, and the conversion factor, normally 0.0027.

Particle size analyses are expressed in percentages of material finer than classified sizes (in millimeters). The size classification used in this report agrees closely with recommendations made by the American Geophysical Union Subcommittee on sediment terminology (Lane and others, 1947). The particle size distributions given in this report are not necessarily representative of the particle sizes of sediment in transport in the natural stream. Most of the organic matter is removed and the sample is subjected to mechanical and chemical dispersion before analysis of the silt and clay.

## COMPOSITION OF SURFACE WATERS

All natural waters contain dissolved 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. Ground water is generally more highly mineralized than surface runoff because it remains in contact with the rocks and soils for much longer periods. Some streams are fed by both surface runoff and ground water from springs 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. 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 water use. The results of analyses generally include silica, iron, calcium, magnesium, sodium, potassium (or sodium and potassium together calculated as sodium), lithium, carbonate, bicarbonate, sulfate, chloride, fluoride, nitrate, boron, pH, dissolved solids, and specific conductance. Aluminum, manganese, color, acidity, dissolved oxygen, 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, and other trace elements are determined occasionally for a few streams in connection with specific problems and the results are reported. 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 in the tables.

### MINERAL CONSTITUENTS IN SOLUTION

#### Silica ( $\text{SiO}_2$ )

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 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. 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.

In this report, sodium and potassium values that are calculated and reported as sodium are indicated by footnote.

### 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 ( $\text{HCO}_3$ ,  $\text{CO}_3$ ,  $\text{OH}$ )

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, alkalinity in moderate amounts 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 ( $\text{SO}_4$ )

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 quan-



tities of chloride in water that contains a high content of calcium and magnesium increases the water's corrosiveness.

### 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, p. 20). 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 ( $\text{NO}_3$ )

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  $\text{NO}_3$ ) 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  $\text{NO}_3$ ) may contribute to methemoglobinemia ("blue babies") (Faucett and Miller, 1946), and more recent investigations conducted in Ohio show that drinking water containing nitrates in the range of 44 to 88 ppm (as  $\text{NO}_3$ ) may cause methemoglobinemia (Waring, 1949). A report published by the National Research Council, Maxcy (1950) concludes that a nitrate content in excess of 44 parts per million (as  $\text{NO}_3$ ) should be regarded as unsafe for infant feeding. U.S. Public Health Service (1962) sets 45 ppm as the upper limit.

### Phosphate ( $\text{PO}_4$ )

Phosphorus is an essential element in the growth of plants and animals. Some sources that contribute nitrate, such as organic

wastes are also important sources of phosphate. 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 often 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) 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) 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) equals 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 impart 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).

### Dissolved oxygen (DO)

Adequate dissolved oxygen is necessary for the life of fish and other aquatic organisms and is an indicator for corrosivity of water, photosynthetic activity, and septicity. It is one of the most important indicators of the condition of a water supply for biological, chemical and sanitary investigations (Rose, 1965).

### Biochemical oxygen demand (BOD)

Biochemical oxygen demand is a measure of the oxygen required to oxidize the carbonaceous organic material usable as a source of food by aerobic organisms.

### Chemical oxygen demand (COD)

Chemical oxygen demand indicates the quantity of oxidizable compounds present in a water and will vary with water compositions, concentration of reagent, temperature, period of contact, and other factors.

### 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.

Most probable number (MPN).--An index for determining the extent of pollution in water is the most probable number which is a direct count of coliform colonies per 100 milliliters of water.

Detergents (MBAS).--Anionic surfactants (methylene blue active substance, MBAS) in detergents 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, and others, 1962). Although the physiological implications of MBAS 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 MBAS 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. 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 to the stream bed. 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 use of water.

### 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 or 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 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 sand size (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 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 The Geological Survey water-supply paper series, "Surface Water Supply of the United States, 1961-65." 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 obtained at the time samples were collected and computed from a stage-discharge relation or from a discharge measurement.

The water-supply papers and numbers which contain more complete records of stream discharge for this report are listed below:

Part 3				Part 4	
Volume No.	WSP	Volume No.	WSP	Volume No.	WSP
Volume 1	1907	Volume 3	1909	Volume 1	1911
Volume 2	1908	Volume 4	1910	Volume 2	1912

## 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 1941-64, are listed below:

Numbers of water-supply papers containing records for  
Parts 3 and 4, 1941-64

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	1962	1942
1945	1030	1951	1197	1957	1520	1963	1948
1946	1050	1952	1250	1958	1571	1964	1955

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 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 page 29 lists State and local agencies that cooperated in quality-of-water investigations included in this volume, and the locations of 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, E. L. Hendricks, chief hydrologist, and G. W. Whetstone, assistant chief for Reports and Data Processing, under the general direction of S. M. Lang, chief, Reports Section, and B. A. Anderson, chief, Data Reports Unit. The data were collected and prepared for publication under the supervision of district chiefs, district chemists, or engineers as follows: In Alabama, S. F. Kapuska succeeded by W. L. Broadhurst; in Georgia, K. A. MacKichan; in Illinois, W. D. Mitchell; in Indiana, M. D. Hale; in Kentucky and Ohio, G. W. Whetstone succeeded by J. J. Molloy; in Maryland and West Virginia, J. W. Wark; in Michigan, A. D. Ash; in Minnesota, D. M. Culterton; in New York, F. H. Pauszek; in North Carolina, G. A. Billingsley succeeded by R. A. Krieger; in Pennsylvania, N. H. Beamer; and in Tennessee, J. S. Cragwell, Jr.

Correspondence regarding the records on this report or any additional information should be directed to the district chief of the appropriate Geological Survey--Water Resources Division offices indicated in the table on page 29. Because of reorganization in recent years, the offices now administering water-quality programs in most of the States differ from those that were administering the programs in 1964.

State	Cooperating agency	Drainage basin	District office
Alabama	Tennessee Valley Authority	Ohio River	P.O. Box V University, Ala. 35486
Georgia	Georgia Department of Mines, Mining, Engineering, and Geology, Garland Peyton, director.		Room 164 Peachtree-Seventh Bldg. Atlanta, Ga. 30323
Illinois	Illinois State Department of Public Works and Buildings, F. S. Lorenz, director through the Division of Waterways, J. C. Guillou, chief waterway engineer. Ohio River Valley Water Sani- tation Commission, E. J. Cleary, executive director and chief engineer.		605 S. Niel St. Champaign, Ill. 61820
Indiana	Indiana Flood Control and Water Resources Com- mission, J. D. Nixon, chairman, J. I. Perrey, chief engineer.	Ohio River, St. Lawrence River	Room 516 611 N. Park Ave. Indianapolis, Ind. 46204



State	Cooperating agency	Drainage basin	District office
Indiana	<p>Indiana Department of Conservation, J. F. Mitchell, director, through Division of Water Resources, C. H. Bechert, director.</p> <p>Indiana Board of Health, A. C. Offut, commissioner, and B. A. Poole, director, Bureau of Environmental Sanitation.</p> <p>Indiana State Highway Commission, R. S. Whitehead, chairman, M. L. Hayes, executive director, F. L. Ashbaucher, chief engineer.</p>	Ohio River, St. Lawrence River	
Kentucky	<p>University of Kentucky, Dr. J. W. Oswald, president through State Geological Survey, W. W. Hagan, director and State geologist.</p> <p>Ohio River Valley Water Sanitation Commission, E. J. Cleary, executive director and chief engineer.</p>	Ohio River	<p>Room 310 Center Bldg. 522 W. Jefferson St. Louisville, Ky. 40202</p>

State	Cooperating agency	Drainage basin	District office
Maryland	Maryland Geological Survey, K. N. Weaver, director.	Ohio River	724 York Rd. Towson, Md. 21204
Michigan	Michigan State Water Resources Commission, L. F. Oeming, executive secretary. Michigan State Department of Conservation, G. E. Eddy, director, succeeded by R. A. MacMulley; G. A. Walker, deputy director.	St. Lawrence River	Room 700 Capitol Savings and Loan Bldg. Lansing, Mich. 48933
Minnesota	Minnesota Department of Con- servation, Division of Water, S. A. Frellsen, director.		Post Office Bldg. St. Paul, Minn. 55101
New York	New York State Department of Conservation, Division of Water Resources, F. W. Montanari, assistant com- missioner.		P.O. Box 948 Federal Bldg. Albany, N. Y. 12201

State	Cooperating agency	Drainage basin	District office
New York	New York State Department of Commerce, Bureau of Industrial Development, H. G. Gallien, director.	St. Lawrence River	
North Carolina	North Carolina Department of Water Resources, W. E. Fuller, director.	Ohio River	P. O. Box 2857 Federal Bldg. Raleigh, N. C. 27602
Ohio	Ohio Department of Natural Resources, F. E. Morr, director, and C. V. Youngquist, chief, Division of Water. Ohio Department of Health, Dr. E. W. Arnold, director, and G. H. Eagle, chief engineer. Miami Conservancy District, M. L. Mitchell, chief engineer. Ohio River Valley Water Sanitation Commission, E. J. Cleary, executive director and chief engineer.		975 West Third Ave. Columbus, Ohio 43212

State	Cooperating agency	Drainage basin	District office
Pennsylvania	Pennsylvania Department of Forests and Waters, M. K. Goddard, secretary.	Ohio River, St. Lawrence River	Federal Bldg. Third and Walnut Sts. Harrisburg, Pa. 17108
Tennessee	Tennessee Department of Conservation, D. M. McSween, commissioner, through Division of Water Resources, R. W. Robinson, director. Tennessee Department of Public Health, R. H. Hutcheson, commissioner, through Stream Pollution Control Division, S. L. Jones, director.	Ohio River	Room 144 Federal Bldg. Nashville, Tenn. 37203
West Virginia	West Virginia Department of Natural Resources, W. L. Lane, director. Ohio River Valley Water Sanitation Commission, E. J. Cleary, executive director and chief engineer.		Room 3303 New Federal Bldg. Charleston, W. Va. 25301

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## WATER-QUALITY STATIONS IN DOWNSTREAM ORDER

## PART 3. OHIO RIVER BASIN

## OHIO RIVER MAIN STEM

3-126. ALLEGHENY RIVER AT WARREN, PA.

LOCATION.--At bridge on U.S. Highway 6, Warren County, approximately 9.5 miles downstream from gaging station near Kinzua.  
DRAINAGE AREA.--2,233 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1948 to September 1951, October 1961 to September 1964.

Water temperatures: October 1948 to September 1951, October 1961 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 742 micromhos Oct. 28; minimum daily, 73 micromhos Mar. 10.

Water temperatures: Maximum, 79°F July 21, 26; minimum, freezing point on many days during winter months.

EXTREMES, 1948-51, 1961-64.--Dissolved solids (1948-49): Maximum, 573 ppm Sept. 11-20, 1949; minimum, 100 ppm Apr. 11-20, 1949.

Hardness (1948-51): Maximum, 180 ppm Oct. 1-10, 1948; minimum, 27 ppm Mar. 1-10, 1951.

Specific conductance: Maximum daily, 1,110 micromhos Oct. 13, 1948; minimum daily, 43 micromhos Jan. 22, 1962.

Water temperatures: Maximum daily, 1,110 micromhos Oct. 13, 1948; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity as mg H <sup>+</sup>	Specific conductance (micro-mhos at 25°C)	Color	
																Calcium	Non-carbonate				
Oct. 1-10, 1963	246	3.5	---	0.00	0.00	47	7.3	60	1.0	110	20	125	0.0	0.2	333	148	58	---	579	7.5	5
Oct. 22, 1963	220	---	---	---	---	---	---	A68	---	95	20	141	---	---	374	150	72	---	663	7.5	3
Nov. 1-10, 1963	832	6.2	---	0.00	0.00	40	7.8	68	3.7	78	19	134	---	0.2	360	132	68	---	620	7.1	4
Dec. 3-7, 9, 1963	3396	4.9	---	0.06	0.00	14	2.7	13	2.2	28	15	30	---	0.0	1.5	109	46	23	163	7.2	7
Jan. 1-10, 1964	2320	4.6	---	0.02	0.00	20	3.6	25	1.9	41	16	52	---	0.0	1.8	158	65	32	279	6.7	6
Feb. 1-10, 1964	3062	---	---	---	---	---	---	A17	---	33	15	31	---	2.1	---	---	50	23	193	7.1	7
Mar. 1-10, 1964	20720	---	---	---	---	---	---	A18	---	29	13	34	---	2.4	---	---	48	24	194	7.1	3
Apr. 1-10, 1964	2870	---	---	---	---	---	---	A17.8	---	32	12	A7.8	---	1.5	---	---	44	16	116	6.6	4
May 1-10, 1964	3705	---	---	---	---	---	---	A17	---	56	15	54	---	1.1	---	---	46	18	166	7.0	4
June 1-10, 1964	1763	---	---	---	---	---	---	A27	---	72	17	79	---	1.1	---	---	78	32	305	7.3	3
July 1-10, 1964	563	---	---	---	---	---	---	A40	---	72	17	79	---	1.1	---	---	102	43	413	7.5	3
Aug. 1-10, 1964	520	5.2	---	0.00	0.00	33	7.5	46	1.4	74	16	97	---	0.6	272	114	53	475	7.5	15	
Sept. 1-10, 1964	401	---	---	---	---	---	---	A49	---	74	17	94	---	7.4	263	110	50	470	7.6	5	

A Calculated Na plus K, reported as Na.

OHIO RIVER MAIN STEM--Continued  
 3-126. ALLEGHENY RIVER AT WARREN, PA.--Continued

Specific conductance (micromhos at 25°C) water year October 1963 to September 1964												
Day	October	November	December	January	February	March	April	May	June	July	August	September
1.....	533	694	--	299	155	371	128	155	321	354	479	375
2.....	544	688	--	297	163	372	133	153	337	406	491	419
3.....	556	688	154	304	181	340	135	180	334	401	502	433
4.....	568	675	164	297	187	331	111	159	296	397	391	452
5.....	575	653	179	298	192	127	106	162	296	376	398	477
6.....	583	654	184	284	207	74	115	167	302	420	439	479
7.....	598	736	208	275	215	76	115	180	300	442	619	477
8.....	612	597	--	257	187	76	110	185	324	435	504	515
9.....	620	430	207	250	221	93	101	194	253	436	497	521
10.....	617	414	--	242	236	73	105	195	254	448	463	541
11.....	632	266	196	242	246	79	116	205	184	449	490	552
12.....	628	268	207	182	257	80	116	208	208	419	499	569
13.....	648	268	207	193	267	89	138	214	233	599	450	590
14.....	642	279	215	187	283	108	151	207	258	281	465	616
15.....	640	289	235	187	283	108	151	207	258	281	465	616
16.....	646	283	244	194	283	99	145	214	271	320	564	606
17.....	656	253	253	205	283	102	149	203	277	285	536	598
18.....	661	290	273	216	302	106	156	210	310	310	501	623
19.....	660	273	273	212	307	115	--	220	297	302	500	624
20.....	668	274	278	221	300	121	--	224	324	389	515	630
21.....	667	290	289	227	173	129	--	239	320	409	534	652
22.....	663	--	289	216	177	136	--	--	340	480	463	675
23.....	678	--	299	228	340	145	--	--	403	425	295	672
24.....	679	321	83	215	335	147	--	--	229	418	439	672
25.....	698	--	296	118	339	156	--	--	243	433	384	661
26.....	688	346	292	119	351	123	--	--	321	435	358	662
27.....	694	--	292	113	354	105	--	301	293	448	350	661
28.....	690	--	291	118	360	107	126	256	312	444	317	655
29.....	742	--	291	122	373	104	139	295	333	441	350	672
30.....	668	277	298	132	--	110	150	292	376	448	361	694
31.....	713	--	299	146	--	112	--	293	--	459	347	--
Average	641	--	239	213	259	137	--	211	292	407	452	578



OHIO RIVER MAIN STEM--Continued  
3-126. ALLEGHENY RIVER AT WARREN, PA.--Continued

Temperature (°F) of water, water year October 1963 to September 1964

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

## FRENCH CREEK BASIN

## 3-240. FRENCH CREEK AT UTICA, PA.

LOCATION --At gaging station on right bank at upstream side of bridge on State Highway 964 at Utica, Venango County, 0.3 mile upstream from Mill Creek.

DRAINAGE AREA.--1,028 square miles

RECORDS AVAILABLE.--Chemical analyses: October 1961 to September 1964.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (Cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity (H <sup>+</sup> )	Specific conductance (micro-mhos at 25°C)	pH or Col
																Calcium	Non-carbonate			
Oct. 23, 1963...	68			0.04	0.01	22	4.6	B26	1.2	154	66	15		1.5	226	160	34		383	7.3
Dec. 13, 1963...	1100	5.0						5.0		49	35	11	0.1	2.5	126	74	34		188	6.4
Jan. 9, 1964...	A1500							B8.1		62	30	11		2.6	--	82	31		199	6.9
Jan. 19, 1964...	3130							B4.1		42	21	7.0		1.8	--	59	25		143	6.7
Mar. 19, 1964...	6750							B5.5		41	22	6.1		1.3	--	54	21		132	6.9
Apr. 23, 1964...	1250							B7.8		82	21	9.1		1.5	120	86	19		205	7.3
May 26, 1964...																				
July 9, 1964...	162							B10		124	25	12		2.0	171	124	23		286	7.3
Aug. 4, 1964...	3470							B6.4		73	23	7.5		2.0	125	82	22		191	7.0
Sept. 15, 1964...	189							B9.9		126	27	12		1.0	169	128	25		288	7.4

A Stage-discharge relation affected by ice.

B Calculated Na plus K, reported as Na.

## CLARION RIVER BASIN

## 3-295. CLARION RIVER AT COOKSBURG, PA.

LOCATION.--At gaging station on left bank at downstream side of bridge on State Highway 36 at Cooksburg, Forest County, 300 feet downstream from Toms Run, and 5 miles upstream from Canther Run.

DRAINAGE AREA.--807 square miles.

RECORDS AVAILABLE.--October 1963 to July 1964.

Chemical analyses, in parts per million, October 1963 to July 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180° C)	Hardness as CaCO <sub>3</sub>		Total acidity as H <sup>+</sup>	Specific conductance (micro-mhos at 25° C)	pH or Col-
																Calcium, magnesium	Non-carbonate			
Oct. 15, 1963...	198	4.7		0.07	--	34	6.8	19	1.9	22	70	49	0.0	1.0	230	113	95		363	6.8
Oct. 23, 1963...	191	--		--	--	--	--	A29	--	40	74	65	--	1.2	292	140	107		428	6.7
Dec. 3, 1963...	874	5.8		0.02	0.02	19	5.1	6.8	1.1	12	48	20	.2	1.3	140	69	59		209	6.3
Jan. 6, 1964...	640	5.1	0.0	.04	.00	30	5.6	22	.4	27	62	44	.4	1.3	232	98	76		322	6.2
Feb. 3, 1964...	800	5.1		.05	.00	14	4.4	7.3	.3	12	39	15	.2	2.0	118	53	43		163	5.9
Apr. 13, 1964...	2130	4.0		.02	.02	14	4.4	6.0	.5	6	41	12	.1	.5	111	53	48		149	5.6
May 18, 1964...	800	--		--	--	--	--	A9.2	--	16	48	20	--	.3	141	71	58		215	6.7
June 15, 1964...	416	--		--	--	--	--	A17	--	22	51	31	--	.4	183	78	60		268	6.5
July 28, 1964...	326	--		--	--	--	--	A13	--	11	59	31	--	1.3	187	86	77		279	6.3

A Calculated Na plus K, reported as Na.

## 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 1964.

WATER TEMPERATURES: October 1944 to June 1953, October 1956 to September 1964.  
Maximum daily, 33° micromhos Nov. 1, 1944; minimum daily, 101 micromhos Mar. 7.

EXTREMES: Specific conductance: 24-28 ppm Oct. 11-20, 1946; minimum, 63 ppm Mar. 1-10, 1945.  
Maximum daily, 33° micromhos Nov. 1, 1944; minimum, 101 micromhos Mar. 7.

EXTREMES: Hardness (1944-47, 1949-53, 1956-59): Maximum, 304 ppm Oct. 11-20, 1946; minimum, 63 ppm Mar. 1-10, 1945.  
Hardness (1944-47, 1949-53, 1956-59): Maximum, 304 ppm Oct. 11-20, 1946; minimum, 63 ppm Mar. 1-10, 1945.

Specific conductance: Maximum daily, 580 micromhos Oct. 18, 1946; minimum daily, 76 micromhos Apr. 8, 9, 1947.  
Water temperatures: Maximum, 86°F July 31 and Aug. 4, 1957; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity as H <sup>+</sup>	Specific conductance (micromhos at 25°C)	pH or Col- or
																Calcium, magnesium	Non-carbonate			
Oct. 1-10, 1963	1210	3.8		0.00	0.00	35	8.8	32	0.8	58	70	54	0.1	0.4	241	124	76		426	7.1
Oct. 24.....	1788	--		--	--	--	--	A30	--	49	77	50	--	--	252	126	86		427	7.0
Nov. 1-10.....	1780	4.7		0.00	0.00	28	10	34	2.2	60	83	58	0	0.5	265	136	87		456	7.4
Dec. 1-10.....	11720	4.4		0.02	0.00	23	5.4	13	2.6	36	43	25	0	2.1	146	80	50		239	6.8
Jan. 1-2, 4-10, 1964.....	7830	6.8		0.03	0.00	26	6.3	14	1.9	44	45	28	0	2.0	165	91	55		275	6.9
Feb. 1-3, 6, 8-10.....	9970	5.7		0.02	0.00	18	4.9	A8.1	1.6	22	46	14	0	2.5	112	65	47		190	6.7
Mar. 1-10.....	74840	--		--	--	--	--	A11	--	23	46	16	--	--	2.7	67	48		201	6.9
Apr. 1-10.....	38650	--		--	--	--	--	A6.2	--	14	39	9.8	--	--	1.7	54	43		155	6.5
May 1-10.....	18100	--		--	--	--	--	A14	--	20	44	11	--	--	0.9	65	49		183	6.3
June 1-10.....	4620	--		--	--	--	--	--	--	48	48	22	--	--	0.4	90	51		265	7.0
July 1-10.....	2150	6.6		0.08	0.00	26	12	16	1.6	53	53	33	1	2	192	115	71		318	7.2
Aug. 1-10.....	5940	4.1		0.08	0.00	22	8.8	16	1.6	39	57	23	1	0.6	136	91	59		267	6.9
Sept. 1-10.....	2440	3.0		0.00	0.00	22	5.8	15	1.2	42	39	26	1	0.4	145	79	45		251	7.1

A Calculated Na plus K, reported as Na.

## QUALITY OF SURFACE WATERS, 1964

## OHIO RIVER MAIN STEM--Continued

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

Specific conductance (micromhos at 25°C), water year October 1963 to September 1964

Day	October	November	December	January	February	March	April	May	June	July	August	September
1.....	416	457	287	279	150	291	158	187	248	303	278	237
2.....	404	468	279	275	168	288	170	171	249	305	279	232
3.....	410	462	296	--	169	300	171	173	245	305	279	239
4.....	418	462	250	274	--	272	168	177	250	301	299	244
5.....	423	465	250	286	--	258	151	189	248	315	325	243
6.....	426	463	239	278	196	163	142	190	259	315	299	243
7.....	431	456	210	283	--	101	143	171	284	319	253	252
8.....	426	472	216	272	214	108	135	168	261	326	271	253
9.....	436	471	218	261	211	103	135	168	261	326	271	253
10.....	440	470	230	255	220	118	151	194	288	326	216	263
11.....	439	482	228	246	216	234	140	204	304	326	209	268
12.....	432	469	249	240	221	116	145	213	288	322	214	277
13.....	428	448	232	218	228	122	150	204	277	318	--	283
14.....	426	440	228	224	228	120	158	219	274	336	229	292
15.....	433	432	224	221	232	129	168	221	280	336	242	288
16.....	428	447	239	220	246	135	170	219	274	268	271	292
17.....	429	427	228	219	246	139	171	201	281	218	287	286
18.....	426	415	241	218	249	140	179	190	277	209	294	296
19.....	425	349	239	217	245	134	188	193	274	215	288	302
20.....	421	311	239	216	246	135	187	194	273	203	285	301
21.....	418	299	241	219	255	155	200	207	280	211	289	319
22.....	428	279	249	219	266	165	173	205	278	203	284	324
23.....	427	280	274	234	269	180	154	221	277	212	283	316
24.....	421	292	282	--	266	185	132	221	277	203	308	327
25.....	430	289	277	210	268	191	126	215	239	207	258	322
26.....	435	275	290	192	267	200	139	229	298	225	230	319
27.....	437	279	281	165	269	186	130	235	291	240	217	324
28.....	445	278	281	146	275	169	138	230	311	252	217	333
29.....	453	264	275	144	290	151	153	270	309	--	206	340
30.....	456	288	272	147	--	148	169	244	305	263	221	354
31.....	459	--	284	151	--	145	--	243	--	269	244	--
Average	430	389	252	225	235	170	157	206	276	272	258	288

OHIO RIVER MAIN STEM--Continued  
3-365. ALLEGHENY RIVER AT KITTANNING, PA.--Continued

Temperature (°F) of water, water year October 1963 to September 1964

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

KISKIMINETAS RIVER BASIN

3-415. CONEMAUGH RIVER AT SEWARD, PA.

LOCATION.--Temperature recorder at gaging station on left bank at highway bridge on State Highway 56 at Seward, Westmoreland County, 2 miles downstream from Findley Run, and 9 miles northwest of Johnstown.

REMARKS.--Temperature recorder at gaging station on left bank at highway bridge on State Highway 56 at Seward, Westmoreland County, 2 miles downstream from Findley Run, and 9 miles northwest of Johnstown.

RECORDS AVAILABLE.--Water temperatures: Maximum, 84°F July 27, 28; minimum, freezing point on many days during winter months.

EXTREMES, 1962-63.--Water temperatures: Maximum, 84°F July 19-21, 27, 28; minimum, freezing point on several days in January.

EXTREMES, 1963-64.--Water temperatures: Maximum, 84°F on several days in 1963 and 1964; minimum, freezing point on many days during 1962-64.

EXTREMES, 1962-64.--Water temperatures: Maximum, 84°F on several days in 1963 and 1964; minimum, freezing point on many days during 1962-64.

REMARKS.--Recorder stopped Dec. 24-30, 1962, Dec. 10-15, and Mar. 20, 21, 1964. Temperature records furnished by Pennsylvania Electric Company.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Calcium	Non-magnesium carbonate			
Oct. 24, 1963.....	169					A51		3	400	23		37	691	370	368	988	5.1	8

A Calculated Na plus K, reported as Na.



KISKIMINETAS RIVER BASIN--Continued  
 3--415. CONEMAUGH RIVER AT SEWARD, PA.--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964

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	71	71	67	67	68	71	71	68	68	68	68	66	64	65	66	68	69	68	68	68	69	71	70	70	71	71	66	56	59	68			
	Minimum	64	66	67	64	64	64	67	67	64	63	64	66	63	60	60	61	65	65	66	65	64	61	61	66	66	66	66	56	53	51	63			
November	Maximum	59	57	51	58	60	62	62	54	52	54	56	54	53	52	51	56	60	61	60	57	59	61	61	57	51	52	54	56	43	--	56			
	Minimum	57	50	48	50	58	60	56	52	52	52	54	53	52	50	50	50	56	60	58	54	54	58	50	46	48	52	54	45	40	--	26			
December	Maximum	40	42	42	44	44	45	45	45	43	--	--	--	--	--	--	40	40	40	37	36	38	40	40	38	37	41	40	39	40	38	41			
	Minimum	40	40	42	42	43	44	43	43	42	--	--	--	--	--	--	38	37	37	34	34	36	38	35	37	36	40	38	37	36	34	38			
January	Maximum	40	42	46	44	40	39	39	37	39	38	34	33	32	32	35	36	38	38	38	38	39	40	39	38	36	38	36	37	37	38	38			
	Minimum	36	40	42	38	37	36	36	34	36	32	32	32	32	32	34	35	34	34	37	36	36	36	38	34	34	34	35	33	35	35	35			
February	Maximum	39	38	38	38	40	40	38	38	38	39	39	40	40	40	40	42	42	38	38	38	39	40	40	43	43	41	44	--	--	40	--			
	Minimum	37	38	36	34	35	38	38	36	34	36	37	35	37	38	36	37	35	38	38	37	36	36	36	37	37	39	36	34	--	37	--			
March	Maximum	44	46	45	38	39	40	42	42	42	42	39	39	43	42	42	44	44	41	40	--	--	--	45	47	48	42	46	46	43	39	43			
	Minimum	36	41	37	37	37	36	38	39	41	38	37	38	38	40	42	39	41	37	36	--	--	--	40	43	47	43	40	41	43	40	39			
April	Maximum	44	43	43	43	45	45	46	46	43	45	50	52	52	55	55	52	60	61	60	56	52	52	55	56	56	57	56	50	--	51	--			
	Minimum	38	40	40	38	39	44	43	44	40	41	44	48	50	52	52	48	52	57	53	49	48	50	52	52	54	54	51	49	--	48	--			
May	Maximum	50	54	58	61	59	64	63	62	66	63	65	65	65	64	65	68	69	70	73	72	71	73	75	75	72	72	69	68	70	67	67			
	Minimum	50	50	52	55	62	60	62	64	64	62	60	60	64	58	56	61	66	65	67	68	65	68	70	72	70	68	70	66	63	64	66			
June	Maximum	67	68	68	69	73	73	72	71	77	76	76	76	76	80	71	71	74	72	74	72	74	75	78	78	73	76	77	78	80	81	--	74		
	Minimum	63	62	65	64	67	67	65	68	70	74	71	70	74	76	72	68	65	67	68	69	72	72	72	68	70	74	72	74	77	--	70			
July	Maximum	82	81	81	80	76	78	78	78	76	78	80	80	74	74	76	78	81	82	84	84	84	80	81	81	80	84	84	78	75	77	79			
	Minimum	78	78	78	75	72	73	74	73	72	72	76	74	69	68	72	73	76	75	73	72	73	75	78	78	79	80	78	77	78	81	83			
August	Maximum	76	77	78	71	76	77	77	76	76	74	76	76	70	70	72	73	76	76	75	73	75	78	80	78	79	80	78	77	78	81	83			
	Minimum	71	75	70	67	70	72	72	72	70	73	72	68	67	68	69	72	74	71	70	71	74	77	76	76	78	73	74	75	78	81	73			
September	Maximum	81	77	77	78	79	77	78	79	80	80	80	75	72	72	72	74	76	78	74	71	72	74	73	68	68	70	70	66	66	--	74			
	Minimum	74	72	73	74	76	72	74	76	76	73	69	67	70	71	71	73	71	73	68	68	70	68	66	65	68	65	68	65	63	62	--			



## KISKIMINETAS RIVER BASIN--Continued

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

LOCATION.--At raw-water intake of West Leechburg plant of Allegheny-Ludlum Steel Corp., 0.2 mile below Brandy Run, Armstrong County, and 6.7 miles downstream from Leechburg, Pa.

Drainage area, 860 acres.

RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1951, October 1958 to July 1959, October 1959 to September 1964.

Water temperatures: October 1946 to September 1951, October 1958 to July 1959, November 1959 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 1,700 micromhos Nov. 5; minimum daily, 199 micromhos Mar. 9.

Water temperatures: Maximum, 85°F July 21, 22; minimum, freezing point Dec. 29, 30 and Jan. 12, 13.

EXTREMES, 1946-51, 1958-64.--Dissolved solids (1946-47, 1959-62): Maximum, 945 ppm Aug. 27 to Sept. 12, 1960; minimum, 141 ppm Mar. 30 to Apr. 8, 1960.

Hardness (1946-47, 1949-51, 1959-62): Maximum, 514 ppm Oct. 1-10, 1946; minimum, 74 ppm Mar. 30 to Apr. 8, 1950.

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 pH of daily samples available in district office at Philadelphia, Pa. Records of discharge are based on records for Kiskiminetas River at Vandergriff.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>			Specific conductance (micro-mhos at 25°C)	pH	Col- or
																Calcium	Non-carbonate	Total acid			
Oct. 1-10, 1963	285	15	12	2.0	8.9	102	38	56	18	0	612	30	0.4	1.2	925	411	411	2.4	1470	3.3	3
Oct. 24	228	--	--	--	--	--	--	--	--	0	604	29	--	1.7	1000	410	440	2.3	1530	3.3	12
Nov. 1-10	481	12	10	1.1	11	114	43	60	17	0	642	31	4	1.0	1010	482	440	2.4	1580	3.3	3
Dec. 1-4, 7-10	2440	11	5.0	.15	7.7	46	19	18	6.6	0	246	18	2	1.8	392	193	193	1.9	667	3.7	4
Jan. 1-4, 7-10, 1964	3190	12	5.0	.35	7.4	46	18	21	6.3	0	238	22	2	2.0	395	189	189	1.0	659	3.7	4
Feb. 1-4, 6-10	3610	9.8	4.2	.16	3.6	39	16	13	5.0	0	198	16	2	2.4	308	164	164	.8	518	3.7	5
Mar. 1-10	6190	10	4.4	.02	4.4	35	14	12	3.6	0	192	12	.2	1.6	293	145	145	.8	534	3.7	8
Apr. 1-10	7940	--	--	--	--	--	--	--	--	0	132	8.5	--	1.9	--	108	108	.7	389	3.7	2
May 1-9	8340	--	--	--	--	--	--	--	--	0	140	7.0	--	3.5	--	114	114	.8	402	3.7	1
June 1-10	1700	--	--	--	--	--	--	--	--	0	140	16	--	1	--	114	114	2.8	380	3.2	1
July 2-10	1720	--	11	--	--	--	--	--	--	0	436	18	--	--	--	335	335	1.0	108	3.2	2
Aug. 1-20	1370	--	--	--	--	--	--	--	--	0	287	12	--	.6	--	220	220	1.6	759	3.2	3
Sept. 2-10	370	--	13	--	--	--	--	--	--	0	652	22	--	4.9	--	470	470	3.3	1550	3.2	6

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

Day	Specific conductance (micromhos at 25°C), water year October 1963 to September 1964											
	October	November	December	January	February	March	April	May	June	July	August	September
1.....	1460	1570	970	--	464	958	546	428	--	--	886	--
2.....	1520	1570	985	837	529	961	313	565	1230	803	713	1450
3.....	1510	1550	375	895	527	833	524	256	--	816	--	1520
4.....	1500	1550	423	813	493	662	445	279	1280	886	814	1540
5.....	1500	1700	--	839	--	449	319	338	1280	1040	835	1530
6.....	1520	1450	--	739	500	426	374	406	1200	1130	737	1550
7.....	1520	1510	556	641	576	957	314	472	1250	1200	814	1600
8.....	1410	1530	593	456	570	225	324	536	1150	1200	809	1550
9.....	1430	1680	675	386	504	199	356	619	1060	1270	699	1600
10.....	1460	1440	705	364	517	238	311	--	985	1240	688	1550
11.....	1460	1060	676	343	514	263	332	710	883	1220	889	1610
12.....	1450	831	509	298	--	282	375	699	854	1250	844	1630
13.....	1480	749	519	298	662	272	439	728	862	1300	943	1630
14.....	1430	609	524	377	668	220	494	780	858	1400	1050	1620
15.....	1470	621	593	476	685	216	542	782	921	1110	1070	1620
16.....	1450	622	555	523	692	232	576	727	1080	1020	1180	1660
17.....	1450	764	603	559	692	320	569	799	1080	854	1240	1660
18.....	1450	772	609	560	722	359	631	801	723	784	1200	1630
19.....	1490	977	659	567	715	396	644	820	699	832	1170	1620
20.....	1490	1040	692	579	--	483	678	862	724	908	1140	1630
21.....	1500	1080	813	--	751	542	540	--	701	1020	1240	1640
22.....	1500	719	709	536	751	542	540	--	501	1020	1240	1640
23.....	1560	1100	803	511	846	563	347	--	393	1100	1260	1640
24.....	1570	1050	813	441	884	565	269	--	374	1210	1290	1620
25.....	1610	1120	--	438	--	556	260	--	394	1210	1370	1630
26.....	1630	1230	798	387	854	584	302	--	467	907	1380	1580
27.....	1650	1260	808	376	975	587	349	--	479	889	1390	1530
28.....	1610	1250	867	297	1000	570	425	--	659	1080	1330	--
29.....	1650	1030	831	255	951	538	435	--	--	743	1430	--
30.....	1460	1020	834	294	--	--	451	--	--	1360	1410	1490
31.....	1590	--	--	389	--	573	--	--	--	1340	1390	--
Average	1500	1100	686	497	683	465	435	--	853	1100	1100	1600

## KISKIMINETAS RIVER BASIN--Continued

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

Temperature (°F) of water, water year October 1963 to September 1964

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

## OHIO RIVER MAIN STEM

3-496.55. ALLEGHENY RIVER AT OAKMONT, PA.

LOCATION.--At intake line to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at Oakmont filtration plant, Allegheny County, 0.5 mile upstream from Hutton Road Bridge, and 10.4 miles downstream from gaging station at Natrona.

DRAINAGE AREA.--11,520 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: July 1963 to September 1964.

EXTREMES 1963-64: Specific conductance, maximum, 1839 micromhos/cm, daily, 733 micromhos Nov. 6; minimum daily, 121 micromhos Mar. 11.

Water temperatures: Maximum 85°F July 25, 29; minimum, freezing point on several days during December and January.

REMARKS.--Values reported for acidity are potential free and determined to pH 7.0. Daily samples were collected at this station and records of specific conductance of daily samples available in district office at Columbus, Ohio. Samples were selected for analyses on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September). Records of discharge are given for Allegheny River at Natrona.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Detergent (MB AS)		
																		Calcium, magnesium	Non-bicarbonate					
Oct. 4, 1963.	1600				0.36	48	12				16	0	43		4.2	--	328	170	157	0.0	530	5.8	--	
Oct. 5.....	1230			--	1.17	--	--	--	--	--	--	--	--	--	--	0.16	--	--	--	--	562	5.6	0.1	
Oct. 18.....	1090			--	1.7	56	15				28	0	52		8.1	10	409	201	178	1.1	652	5.5	1.1	
Oct. 31.....	1800			--	2.0	57	18				0	0	52		6.7	--	428	216	216	1.4	733	4.2	--	
Nov. 6.....	1800			--	3.0	--	--	--	--	--	--	226	--	--	--	13	--	--	--	--	678	4.8	1.1	
Nov. 12.....	7050					--	--	--	--	--	--	76	--	--	--	16	--	204	121	93	0	475	6.6	1.1
Nov. 21.....	5740			--	1.10	--	--	--	--	--	34	0	35		2.5	--	204	121	93	0	372	6.1	--	
Nov. 28.....	4080			--	.43	34	8.8				28	0	174		3.8	--	244	134	111	0	266	6.4	--	
Dec. 1.....	12900			--	.24	37	10				20	0	22		2.9	--	165	82	66	0	286	6.4	--	
Dec. 11.....	13500			--	.44	23	6.1				--	--	--		--	.09	--	--	--	--	292	6.7	0	
Dec. 20.....	4470			--	.38	--	--	--	--	--	--	76	--	--	--	--	102	--	--	--	352	6.6	1.1	
Dec. 31.....	6650			--	.36	--	--	--	--	--	--	102	--	--	--	.04	--	--	--	--	352	6.6	1.1	
Jan. 1, 1964.	6120			--	.31	--	--	--	--	--	--	103	--	--	--	.05	--	224	116	106	--	355	7.3	0
Jan. 8.....	17200			--	.35	30	10				12	0	108		4.3	--	224	116	106	--	364	6.4	--	
Jan. 12.....	27500			--	.41	--	--	--	--	--	--	73	--	--	--	.04	--	--	--	--	264	7.3	0	
Jan. 23.....	22100			--	1.2	--	--	--	--	--	--	91	--	--	--	.08	--	--	--	--	290	6.2	0	
Jan. 26.....	62600			--	.60	--	--	--	--	--	13	0	44		3.2	--	111	58	47	1.0	240	6.3	0	
Jan. 28.....	34100			--	1.64	15	4.9				--	--	15		--	.22	--	111	58	47	--	175	6.2	--
Feb. 2.....	24800			--							2	0	72		2.8	--	139	72	71	1.1	225	5.0	--	
Feb. 8.....	17900			--	1.1	18	6.7				--	80	--	--	--	.22	--	139	72	71	1.1	225	5.0	--
Feb. 15.....	10600			--	1.3	--	--	--	--	--	--	90	--	--	--	13	--	--	--	--	254	6.6	0	
Feb. 22.....	8300			--	1.8	--	--	--	--	--	--	108	--	--	--	.19	--	--	--	--	288	6.4	0	
Feb. 29.....	6190			--	1.6	31	9.7				16	0	26		3.5	--	219	118	105	0	333	6.5	0	
Feb. 29.....	6190			--	1.6	31	9.7				16	0	26		3.5	--	219	118	105	0	333	6.5	0	
Feb. 29.....	6190			--	1.6	31	9.7				16	0	26		3.5	--	219	118	105	0	333	6.5	0	
Feb. 29.....	6190			--	1.6	31	9.7				16	0	26		3.5	--	219	118	105	0	333	6.5	0	

## OHIO RIVER MAIN STEM--Continued

3-496.55. ALLEGHENY RIVER AT OAKMONT, PA.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Detergent (MB AS)	
																	Calcium, magnesium	Non-carbonate				
Mar. 2, 1964.	6450		1.8	32	11					14	0	123	22	3.8	--	234	125	114	0.0	376	6.6	--
Mar. 11.....	186000		.79	11	3.4					6	0	33	6.0	2.6	--	77	42	36	--	121	5.7	--
Mar. 14.....	117000		1.2	--	--					--	--	49	--	--	0.14	--	--	--	--	139	4.9	0.1
Mar. 19.....	61300		1.3	--	--					--	--	80	--	--	.15	--	--	--	--	244	5.0	.1
Mar. 26.....	27200			--	--					--	--	88	--	--	.06	--	--	--	--	266	4.8	.0
Apr. 2.....	25400		.30	--	--					--	--	79	--	--	.19	--	--	--	--	237	4.9	.0
Apr. 5.....	64200		1.2	--	--					--	--	85	--	--	.12	--	--	--	--	207	5.6	.0
Apr. 17.....	24700		1.0	--	--					--	--	80	--	--	.06	--	--	--	--	238	6.5	.0
Apr. 21.....	37500		.91	22	7.6					6	0	80	20	2.0	--	147	86	81	.0	244	6.8	--
Apr. 25.....	63400		.52	14	5.3					6	0	49	16	2.0	--	98	57	52	.0	162	6.6	--
May 2.....	37400		.80	--	--					--	--	75	--	--	.03	--	--	--	--	217	6.0	.0
May 4.....	34200		.65	16	7.4					2	0	71	10	1.9	--	137	70	69	.0	201	5.5	--
May 8.....	18000		1.2	--	--					--	--	94	--	--	.02	--	--	--	--	233	4.9	.0
May 23.....	13500		1.0	--	--					--	--	100	--	--	.68	--	--	--	--	276	6.3	.0
May 26.....	7870		.07	--	--					--	--	94	--	--	.07	--	--	--	--	315	6.7	.0
May 31.....	5490		.74	28	10					15	0	108	18	1.1	--	211	111	99	.0	323	7.3	--
June 1.....	5180		.67	29	9.0					22	0	91	22	1.2	--	180	110	92	.0	313	6.6	--
June 6.....	6650		1.7	--	--					--	--	128	--	--	.10	--	--	--	--	382	6.5	.0
June 11.....	9010		2.4	--	--					--	--	151	--	--	.06	--	--	--	--	426	6.5	.0
June 20.....	8510		3.2	39	13					4	0	158	26	2.8	--	270	151	148	.0	428	6.4	--
June 23.....	8150		2.4	--	--					--	--	137	--	--	.12	--	--	--	--	394	5.1	.0
July 4.....	2900		1.2	--	--					--	--	151	--	--	.10	--	--	--	--	422	5.8	.0
July 11.....	16300		.82	43	14					5	0	166	30	3.1	--	310	165	161	--	471	5.8	--
July 19.....	5930		.14	--	--					--	--	87	--	--	.07	--	--	--	--	328	7.2	.0
July 23.....	3030		.21	25	6.3					15	0	76	26	2.0	--	170	88	76	--	277	6.7	--
July 29.....	4610		3.4	--	--					--	--	156	--	--	.11	--	--	--	--	426	4.4	.0
Aug. 3.....	5430		3.4	42	13					0	0	182	22	3.4	--	292	159	159	.4	485	4.2	--
Aug. 10.....	3640		1.9	--	--					--	--	126	--	--	.10	--	--	--	--	374	6.0	.1

Aug. 22, 1964	3490	1.0	--	--	--	--	--	--	121	--	--	--	--	--	--	--	--	363	6.4	0.0
Aug. 23.....	11000	.57	--	--	--	--	--	--	127	--	--	--	--	--	--	--	--	374	6.5	.0
Aug. 30.....	5430	.36	25	7.1	--	--	--	--	72	26	--	--	--	1.8	--	--	--	273	6.5	--
Sept. 1.....	4240	.70	26	7.2	--	--	--	--	79	26	--	--	--	2.1	--	--	--	299	7.2	--
Sept. 5.....	2940	.62	--	--	--	--	--	--	95	--	--	--	--	.16	--	--	--	328	6.5	.0
Sept. 12.....	3320	.71	--	--	--	--	--	--	136	--	--	--	--	.16	--	--	--	359	8.8	.0
Sept. 18.....	2310	.74	--	--	--	--	--	--	146	--	--	--	--	.16	--	--	--	359	8.1	.1
Sept. 26.....	2250	4.3	52	--	--	--	--	--	188	--	--	--	--	.42	--	--	--	534	6.1	--
Sept. 29.....		5.2	52	20	--	--	--	--	245	28	--	--	--	5.2	--	--	--	670	3.9	--

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement usually between 0700 and 0900)

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

## MONONGAHELA RIVER BASIN

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

LOCATION.--At city water plant, at Elkins, Randolph County, 2.5 miles upstream from gaging station.  
 DRAINAGE AREA.--268 square miles upstream from water plant; 272 square miles upstream from gaging station.  
 RECORDS AVAILABLE.--Water temperatures: January 19 to September 1964, 33°P Dec. 19, 22.  
 TEMPERATURES.--Water temperatures: Maximum, 79°F July 22, 1952; minimum, freezing point on many days during winter months.  
 EXTREMES, 1947-64.--Water temperatures: Maximum, 92°F July 22, 1952; minimum, freezing point on many days during winter months.  
 REMARKS.--No appreciable inflow between water plant and gaging station except during periods of heavy local rains. During flood periods part of the flow is diverted around the water plant in a flood by-pass channel.

Temperature (°F) of water, water year October 1963 to September 1964

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

## MONONGAHELA RIVER BASIN--Continued

3-890. 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.

REMARKS.--14 square miles. Dates: October 1946 to December 1948, April to September 1949, January to September 1950, and October 1952 to September 1964.

RECORDS AVAILABLE.--Water temperatures: Maximum, 87°F Aug. 26, 1959; minimum, freezing point on many days during winter months.

EXTREMES, 1946-50, 1952-64.--Water temperatures:

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Alum. (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity H <sup>+</sup>	Specific conductance (micro-mhos at 25°C)	Col. or pH
																Calcium	Non-carbonate			
Oct. 30, 1963.	22	1.9	0.0	0.22	0.00	8.5	0.7	1.1	0.7	23	7.6	1.2	0.1	0.0	36	24	5	58	7.8	5
Apr. 17, 1964.	527			.07				.6		8	5.8	.6		.8	24	11	5	30	6.3	4

Temperature (°F) of water, water year October 1963 to September 1964

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	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
November.....	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56
December.....	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
January.....	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	34
February.....	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	34
March.....	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
April.....	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
May.....	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56
June.....	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
July.....	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
August.....	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76
September.....	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70



## 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 mouth.

DRAINAGE AREA.--1,411 square miles.

DATE.--October 1948 to September 1964.

WATER TEMPERATURES.--Maximum, 86°F; minimum, 33°F on several days during winter months.

REMARKS.--Records furnished by the West Penn Power Company.

Temperature (°F) of water, water year October 1963 to September 1964

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		
68	68	67	67	58	58	56	67	66	66	67	56	50	56	67	66	66	66	50	50	66	65	67	50	57	50	47	64	63	60	60	--	
60	--	46	44	44	44	53	53	41	38	38	38	37	42	48	36	36	36	35	35	51	51	37	37	37	36	35	47	47	47	36	36	--
--	36	36	--	--	35	35	35	35	--	--	--	34	33	33	33	34	--	--	34	34	34	34	34	34	--	36	38	36	37	37	--	--
--	--	37	38	38	37	37	--	--	36	36	35	35	36	--	--	37	37	36	36	--	--	--	36	36	36	36	--	--	--	--	--	--
--	36	37	36	39	38	--	--	--	40	40	44	44	44	--	--	42	42	42	43	44	--	--	46	46	46	46	--	--	44	44	--	--
44	44	45	--	--	44	45	45	45	47	--	--	50	52	52	54	56	--	--	56	58	58	60	62	72	74	60	62	61	61	--	--	
--	--	62	62	63	65	66	67	--	--	64	66	66	64	64	64	67	67	68	67	69	70	--	--	72	74	73	71	80	80	--	--	
70	69	68	68	--	--	--	74	76	75	74	76	--	--	76	76	74	74	--	77	78	76	74	74	74	--	--	--	--	--	--	--	--
--	--	--	--	--	79	80	77	79	79	--	--	77	77	77	79	80	--	--	82	84	84	85	85	--	--	85	86	86	82	82	--	--
80	80	--	82	81	--	--	--	80	80	77	76	76	--	--	76	78	75	76	77	--	--	78	77	77	77	77	77	77	77	76	--	--
--	--	76	78	--	--	79	80	--	--	--	--	--	--	73	72	--	74	--	--	74	75	74	72	72	--	--	68	68	68	--	--	

## MONONGAHELA RIVER BASIN--Continued

3-750. MONONGAHELA RIVER AT CHARLEROI, PA.

LOCATION.--At intake to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at Charleroi filtration plant, Washington County, 1 mile downstream from bridge on Interstate Highway 70-S, and 0.8 mile upstream from gaging station.

DRAINAGE AREA.--5,213 square miles (at gaging station).

RECORDS AVAILABLE.--Chemical analyses: July 1963 to September 1964.

WATER TEMPERATURES: July 1963 to September 1964.

REMARKS.--Values reported for acidity are potential free and determined to pH 7.0. Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September).

REMARKS.--Values reported for acidity are potential free and determined to pH 7.0. Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September).

REMARKS.--Values reported for acidity are potential free and determined to pH 7.0. Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September).

## Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Detergent (MB AS)
																	Calcium	Non-carbonate			
Oct. 8, 1963.	1080				1.6	59	17				0	0	286		2.5		217	217	720	4.0	--
Oct. 12, 1963.	740				1.1	--	--	--	--	--	0	0	284		--	0.10	--	--	675	4.3	0.0
Oct. 16, 1963.	820				1.0	44	13				0	0	239		1.5	--	164	164	601	4.0	--
Oct. 18, 1963.	1170				1.85	--	--	--	--	--	0	0	368		--	.04	--	--	712	3.8	--
Nov. 7, 1963.	1770				1.7	--	--	--	--	--	0	0	382		--	.03	--	--	712	3.8	--
Nov. 12, 1963.	5560				.41	15	5.2				0	0	78		.5	--	59	59	241	4.0	--
Nov. 19, 1963.	2580				.95	--	--	--	--	--	0	0	188		--	.07	--	--	519	3.8	0
Nov. 29, 1963.	3360				2.1	65	21				0	0	381		3.2	--	249	249	902	3.6	--
Dec. 5, 1963.	10500				.82	33	9.0				0	0	136		1.4	--	120	120	1407	4.1	--
Dec. 13, 1963.	8960				.23	13	3.8				4	0	54		1.2	--	48	45	1166	4.9	--
Dec. 19, 1963.	4760				.46	--	--	--	--	--	--	--	86		--	.07	--	--	3258	4.9	0
Dec. 25, 1963.	2910				.68	--	--	--	--	--	--	--	122		--	.09	--	--	344	4.9	1
Jan. 1, 1964.	21400				.37	--	--	--	--	--	--	--	108		--	.04	--	--	315	4.7	0
Jan. 9, 1964.	19200				.44	23	8.2				0	0	125		2.6	--	91	91	358	4.1	--
Jan. 14, 1964.	14600				.31	--	--	--	--	--	0	0	59		--	.08	--	--	163	5.8	0
Jan. 17, 1964.	7110				.36	10	3.3				3	0	45		1.8	--	38	36	129	5.5	--
Jan. 25, 1964.	16900				.37	--	--	--	--	--	--	--	113		--	.06	--	--	307	4.9	0
Jan. 26, 1964.	19700				.61	--	--	--	--	--	--	--	92		--	.15	--	--	251	5.6	0
Feb. 2, 1964.	7280				.44	--	--	--	--	--	--	--	93		--	.10	--	--	259	5.2	0
Feb. 5, 1964.	6270				.34	15	4.1				4	0	66		1.9	--	54	52	188	5.5	--
Feb. 8, 1964.	6240				.52	27	7.8				--	--	113		--	.10	--	--	348	4.4	0
Feb. 18, 1964.	6240				.52	27	7.8				0	0	110		2.1	--	100	100	348	4.4	0
Feb. 29, 1964.	4400				.48	--	--	--	--	--	--	--	110		--	.08	--	--	304	5.0	0







## OHIO RIVER MAIN STEM

3-860.6. OHIO RIVER AT SOUTH HEIGHTS, PA.

LOCATION. --At intake line to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at Duquesne Powerplant at South Heights, Beaver County, 1.6 miles upstream from Ambidge-woodland Bridge.

DATA. --1963-64.--Specific conductance.

RECORDS AVAILABLE.--Chemical analyses: July 1963 to September 1964.

Water temperatures: July 1963 to September 1964.

EXTREMES. 1963-64.--Specific conductance: Maximum daily, 828 micromhos Oct. 12; minimum daily, 142 micromhos Mar. 8.

Water temperatures: Maximum, 85°F July 25, 26; minimum, 35°F Dec. 21, 22, Jan. 12, 18.

REMARKS.--Values reported for acidity are potential free and determined to pH 7.0. Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September).

Chemical analyses, in parts per million, water year October 1963 to September 1964

CHEMICAL ANALYSES, 1963-1964, OF WATER TAKEN OCTOBER 1960 TO SEPTEMBER 1964																							
Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Degreer (MB AS)		
																			Calcium, magnesium	Non-bicarbonate	Acidity (micro-mhos at H <sup>+</sup> , 25°C)		
Oct. 3, 1963.																			162	152	0.1	554	5.9
Oct. 8.						0.81	45	12			12	0	180	35	8.0	--	356	490	290	51	--	575	5.8
Oct. 12.						1.0	80	22			292	0	146	38	--	0.46	--	490	290	51	--	828	7.1
Oct. 31.						1.0	--	--			--	--	226	--	--	.96	--	--	--	--	--	655	6.1
Nov. 9.						1.3	65	13			24	0	248	44	14	--	444	216	196	--	--	722	6.1
Nov. 13.						1.1	--	--			--	--	252	--	--	.35	--	--	--	--	--	672	4.4
Nov. 23.						1.2	--	--			18	0	120	--	--	.13	260	126	111	--	--	468	6.8
Nov. 30.						1.3	36	8.8			18	0	130	31	5.6	--	--	260	126	111	--	418	5.9
Dec. 2.						1.3	37	11			4	0	178	17	5.0	--	292	138	135	--	--	474	5.3
Dec. 11.						1.07	--	--			--	--	178	--	--	.23	--	151	76	69	--	330	5.5
Dec. 20.						1.00	20	6.2			8	0	77	17	3.6	--	151	76	69	--	--	250	5.7
Dec. 29.						1.00	--	--			--	--	109	--	--	.10	--	--	--	--	--	366	5.9
Jan. 4, 1964.						1.27	--	--			--	--	120	--	--	.15	--	--	--	--	--	409	6.5
Jan. 5.						1.26	33	9.4			18	0	131	31	6.8	--	256	121	106	--	--	425	6.9
Jan. 12.						1.81	--	--			--	--	86	--	--	.12	--	--	--	--	--	256	5.7
Jan. 14.						1.37	16	4.3			9	0	56	9.0	3.2	--	108	58	50	--	--	176	6.3
Jan. 21.						1.27	--	--			--	--	87	--	--	.06	--	--	--	--	--	286	6.3
Jan. 22.						1.3	--	--			--	--	90	--	--	.15	--	--	--	--	--	280	5.9
Jan. 27.						1.3	--	--			--	--	--	--	--	--	--	--	--	--	--	280	5.9
Feb. 1.						1.80	19	5.8			6	0	71	9.0	4.1	--	144	72	66	--	--	218	5.7
Feb. 7.						1.1	--	--			--	--	99	--	--	.10	--	--	--	--	--	284	5.7
Feb. 15.						1.87	--	--			--	--	98	--	--	.11	--	--	--	--	--	289	5.5
Feb. 20.						1.2	--	--			--	--	124	--	--	.12	--	--	--	--	--	303	5.0
Feb. 25.						1.4	31	9.9			8	0	126	18	5.1	--	232	118	112	--	--	351	5.2
Feb. 25.						1.4	31	9.9			8	0	126	18	5.1	--	232	118	112	--	--	351	5.2
Feb. 25.						1.4	31	9.9			8	0	126	18	5.1	--	232	118	112	--	--	351	5.2



Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement at 0830)

[illegible]



## BEAVER RIVER BASIN

## 3-940. MAHONING RIVER AT LEAVITTSBURG, OHIO

LOCATION.--Temperature recorder at gaging station on right bank at highway bridge at Leavittsburg, Trumbull County, 300 feet downstream from Duck Creek, and 1.2 miles downstream from Eagle Creek.

DRAINAGE AREA.--80 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 1964.

Water temperatures: Maximum, 80°F June 29, July 19, 20; minimum, freezing point on many days during December to February.

EXTREMES, 1963-64.--Water temperatures: Maximum, 80°F June 29, July 19, 20; minimum, freezing point on many days during winter months.

EXTREMES, 1948-64.--Water temperatures: Maximum, 86°F July 2, 1949; minimum, freezing point on many days during winter months.

REMARKS.--No temperature records Dec. 5-19, range 32°F to 40°F; Mar. 1-13, range 32°F to 42°F.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> ) (mg/l)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at 25°C)	pH	Coliforms per million	Dissolved oxygen
																		Calcium	Non-carbonate				
Sept. 24, 1964				0.11	0.26						84	0	110	17	0.5	2.1	259	178	109	428	7.6	7.8	81



## BEAVER RIVER BASIN--Continued

3-995. MAHONING RIVER AT LOWELLVILLE, OHIO

LOCATION.--On left bank, 600 feet upstream from Washington Street Bridge at Lowellville, Mahoning County, 300 feet upstream from gaging station located 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 (revised): October 1951 to September 1953, October 1956 to September 1964.

Water temperatures: October 1943 to September 1944 (incomplete), October 1949 to September 1964. EXTREMES, July 1963 to September 1964.--Specific conductance: Maximum daily, 1,207 micromhos Feb. 2, 1964; minimum daily, 220 micromhos Apr. 4, 1964.

Water temperatures: Maximum 106°F Sept. 10, 1964; minimum, 42°F Mar. 12, Apr. 4, 5, 1964.

EXTREMES, 1949-64.--Specific conductance (1951-53, 1956-64): Maximum daily, 1,200 micromhos Feb. 27, 1964; minimum daily, 160 micromhos Feb. 11, 1959.

Water temperatures: Maximum, 112°F Aug. 19, 1955; minimum, freezing point Dec. 5, 1960.

Data from continuous recorder, July to September 1963

Day	JUNE								JULY							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..									580	560	7.1	6.6	1.7	0.0	98	94
2..									620	550	7.2	6.2	.6	.0	96	93
3..									590	540	7.2	6.4	2.4	.0	93	89
4..									--	--	6.7	5.5	2.1	.0	94	88
5..									--	--	7.0	6.4	3.3	.0	92	86
6..									--	--	6.6	6.0	2.1	.0	89	85
7..									--	--	7.4	6.1	3.2	.0	92	85
8..									--	--	6.9	6.1	2.5	.0	89	84
9..									--	--	6.6	6.0	1.2	.0	88	81
10..									--	--	6.5	6.2	.9	.0	87	85
11..									--	--	6.8	6.3	.1	.0	93	82
12..									--	--	6.9	6.1	1.8	.0	94	86
13..									--	--	7.1	6.5	1.9	.0	93	85
14..									--	--	7.1	6.5	2.7	.0	87	79
15..									--	--	7.0	6.5	2.5	1.8	87	79
16..									--	--	6.8	6.1	2.0	.0	88	84
17..									--	--	7.0	6.5	2.0	.6	96	85
18..									--	--	7.0	6.1	1.2	.6	96	86
19..									--	--	--	--	1.2	.6	97	90
20..									--	--	--	--	1.7	.5	93	90
21..									--	--	--	--	2.0	.6	93	85
22..									--	--	--	--	2.2	.9	93	88
23..									--	--	--	--	2.8	1.4	91	84
24..									--	--	--	--	2.4	1.2	93	87
25..									--	--	--	--	2.1	.6	--	--
26..									--	--	--	--	1.8	.6	--	--
27..									--	--	--	--	1.6	.0	--	--
28..									--	--	--	--	1.8	.1	--	--
29..									--	--	--	--	1.3	1	--	--
30..									--	--	--	--	2.7	.0	89	84
31..									--	--	--	--	2.5	.0	90	84
	AUGUST								SEPTEMBER							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..					1.9	0.0	90	85	--	--	--	--	--	--	90	84
2..					1.6	.0	91	84	--	--	--	--	1.8	0.6	88	82
3..					1.5	.0	90	85	--	--	--	--	.6	.4	89	83
4..					1.9	.0	86	--	--	--	--	--	.5	.4	90	84
5..					3.0	.0	90	84	--	--	--	--	.5	.5	87	81
6..					2.8	.0	87	80	--	--	--	--	--	--	88	85
7..					1.2	.0	89	86	--	--	--	--	--	--	90	83
8..					1.8	.0	90	87	--	--	--	--	--	--	90	85
9..					.3	.0	91	87	--	--	--	--	--	--	93	85
10..					.0	.0	--	--	--	--	--	--	--	--	92	86
11..					.0	.0	--	--	--	--	--	--	--	--	94	83
12..					2.2	.0	--	--	--	--	--	--	--	--	90	78
13..					.5	.0	88	84	--	--	--	--	3.5	1.5	90	72
14..					.9	.0	88	85	--	--	--	--	3.1	1.1	91	86
15..					.5	.0	92	85	--	--	--	--	3.3	1.4	90	85
16..					.2	.0	92	85	--	--	--	--	3.6	.2	92	85
17..					--	.0	92	89	--	--	--	--	2.6	1.7	93	87
18..					--	--	91	83	--	--	--	--	2.5	1.0	93	84
19..					--	--	88	82	--	--	--	--	3.9	.6	93	84
20..					--	--	89	85	--	--	--	--	--	--	91	86
21..					--	--	96	87	--	--	--	--	.9	.2	87	83
22..					--	--	95	87	--	--	--	--	1.5	.4	83	79
23..					--	--	94	87	--	--	--	--	2.0	1.1	85	79
24..					.9	.3	89	87	--	--	--	--	1.8	.4	84	78
25..					.4	.3	91	81	--	--	--	--	1.6	.4	87	76
26..					.3	.2	90	82	--	--	--	--	--	--	90	79
27..					.2	.0	91	84	700	650	8.3	6.4	.1	.0	88	81
28..					--	--	91	85	690	650	7.3	6.9	--	--	87	84
29..					--	--	92	88	--	--	--	--	--	--	--	--
30..					--	--	91	86	720	640	7.3	7.1	2.1	.0	84	76
31..					--	--	90	86	--	--	--	--	--	--	--	--

## BEAVER RIVER BASIN--Continued

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

Data from continuous recorder, water year October 1963 to September 1964

Data from continuous recorder, water year October 1963 to September 1964																
Day	OCTOBER								NOVEMBER							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..	730	--	--	6.7	--	0.0	87	--	800	670	7.2	6.6	--	--	80	75
2..	710	650	7.3	6.5	0.1	.0	87	78	770	700	7.2	6.8	--	0.0	75	70
3..	760	630	7.0	6.3	.4	.0	85	82	720	660	7.4	7.1	--	.0	71	67
4..	800	720	6.6	5.7	1.4	.3	87	79	830	700	7.2	6.6	--	--	76	69
5..	750	700	7.2	6.3	--	.0	87	78	860	770	6.8	6.3	--	.0	80	76
6..	740	700	7.3	6.6	.2	.0	86	78	920	840	6.8	6.6	--	--	82	78
7..	750	700	7.3	6.8	.2	.0	90	79	--	--	--	--	--	--	--	--
8..	730	690	7.0	6.6	--	--	85	79	--	--	--	--	--	--	--	--
9..	700	660	6.9	6.7	--	--	81	78	--	--	--	--	--	--	--	--
10..	700	670	7.1	6.8	--	--	90	82	--	--	--	--	--	--	--	--
11..	--	--	7.3	5.9	--	--	88	80	--	--	--	--	--	--	--	--
12..	720	690	7.7	6.4	--	--	85	81	900	850	6.5	5.3	1.2	.2	74	70
13..	730	710	7.5	7.0	--	--	84	78	930	840	6.3	5.2	.2	.0	74	70
14..	810	720	7.3	6.5	--	--	88	80	940	850	6.3	5.8	--	.2	75	70
15..	790	740	6.8	6.3	--	--	86	79	950	820	6.5	6.1	--	--	77	72
16..	1000	740	6.5	3.8	--	--	87	78	950	880	6.6	6.3	1.2	.0	77	73
17..	770	730	6.9	5.9	--	.0	89	80	--	--	--	--	--	--	--	--
18..	800	730	--	--	--	.0	91	81	930	880	7.0	6.4	1.6	.0	78	75
19..	780	720	--	--	--	.0	86	81	950	900	6.6	5.1	--	.0	81	74
20..	770	740	--	--	--	--	86	81	980	850	6.2	4.7	--	.0	78	74
21..	820	750	--	--	--	--	86	81	850	780	6.6	6.1	--	--	78	75
22..	880	790	--	--	--	--	88	81	860	790	6.8	6.3	--	.0	82	76
23..	860	800	--	--	--	.0	88	83	850	800	7.1	6.8	--	.0	82	75
24..	860	810	--	--	--	--	91	84	880	760	7.1	6.4	--	--	76	69
25..	850	810	--	--	--	--	92	85	860	770	6.5	6.2	2.5	1.8	70	67
26..	880	800	--	--	--	.0	89	86	880	820	6.5	5.6	1.8	1.0	77	69
27..	950	790	--	--	--	.0	89	84	930	840	7.0	5.6	1.0	.0	77	74
28..	890	780	--	--	--	--	87	82	950	760	7.6	6.1	.3	.0	77	74
29..	870	800	--	--	--	.0	83	79	780	570	7.9	7.6	--	--	75	63
30..	860	780	--	--	--	.0	78	75	670	590	7.6	7.2	--	--	63	60
31..	820	750	6.8	6.4	--	.0	80	76	--	--	--	--	--	--	--	--
DECEMBER								JANUARY								
1..	710	660	7.7	7.4	--	62	59	910	750	7.8	7.6	0.0	0.0	63	60	
2..	750	680	7.6	7.1	--	65	62	960	910	8.1	7.8	.0	.0	69	63	
3..	--	--	--	--	--	--	--	940	900	8.3	7.4	.0	.0	70	65	
4..	960	850	7.3	6.8	--	70	67	1000	880	8.2	7.5	.0	.0	66	60	
5..	1000	910	7.3	6.8	--	70	65	960	890	8.5	8.1	.0	.0	66	64	
6..	990	890	6.9	6.4	--	70	65	960	790	8.6	7.3	.0	.0	69	63	
7..	1000	870	7.6	6.5	--	72	69	910	810	7.6	7.0	.0	.0	68	63	
8..	950	780	8.0	7.0	--	69	65	940	800	7.4	7.0	.1	.0	68	63	
9..	880	780	7.8	7.0	--	66	62	920	700	7.8	7.1	.0	.0	69	60	
10..	1000	880	7.4	6.8	--	66	62	910	610	8.0	7.8	1.9	.0	60	56	
11..	1000	1000	6.9	5.2	--	68	64	920	610	8.2	7.9	2.0	.0	60	56	
12..	1000	900	7.3	6.2	--	66	62	880	690	8.2	6.9	2.0	.0	57	54	
13..	1010	930	7.4	7.1	--	67	64	910	690	7.0	6.8	2.0	.0	57	52	
14..	1000	930	7.3	6.9	--	66	59	960	660	6.9	5.7	3.0	.0	58	52	
15..	990	850	7.3	7.0	--	59	57	980	730	6.6	5.3	2.3	.0	63	55	
16..	930	850	7.7	6.7	--	61	57	1000	790	6.7	5.8	1.8	.0	66	60	
17..	980	930	7.4	6.9	--	65	59	1000	850	6.4	5.9	.0	.0	67	63	
18..	990	940	7.2	5.7	--	65	63	1000	790	6.8	6.1	.8	.0	67	63	
19..	940	900	7.2	7.0	--	63	58	1000	790	7.2	6.4	.0	.0	66	60	
20..	940	890	7.6	7.1	--	63	59	1000	810	7.2	6.4	.0	.0	64	60	
21..	940	890	7.6	7.2	--	62	60	950	790	7.0	6.8	1.2	.0	59	54	
22..	910	840	7.7	7.5	--	62	60	900	740	7.1	6.5	2.6	.9	--	--	
23..	860	840	7.5	6.7	--	62	60	820	640	7.3	6.5	2.4	.6	--	--	
24..	850	790	7.0	6.7	--	63	59	790	620	7.3	6.9	.9	.1	--	--	
25..	790	740	7.3	7.0	--	60	55	720	540	7.5	7.1	.9	.1	--	--	
26..	840	720	7.3	7.1	--	64	56	--	--	7.4	7.1	.1	.1	--	--	
27..	980	810	7.5	7.1	--	64	61	490	360	7.4	6.4	--	--	--	--	
28..	1000	970	7.5	7.0	--	61	59	550	380	6.7	6.4	--	--	--	--	
29..	1020	770	7.5	7.1	--	61	60	680	440	6.6	5.8	--	--	--	--	
30..	970	890	7.8	7.1	--	63	57	720	660	6.7	6.4	--	--	--	--	
31..	1000	820	7.7	7.6	0.1	0.0	65	60	920	720	6.6	5.9	--	--	--	--

## BEAVER RIVER BASIN--Continued

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

Data from continuous recorder, water year October 1963 to September 1964--Continued

Day	FEBRUARY								MARCH							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..	800	770	6.9	6.5			--	--	1090	1000	7.2	6.7	--	--	69	64
2..	810	770	7.2	6.4			--	--	1000	980	6.8	6.4	--	--	69	64
3..	950	770	6.5	6.2			--	--	1000	--	6.9	6.2	--	--	67	60
4..	1000	900	6.6	6.4			--	--	--	--	--	--	--	--	--	--
5..	1000	910	6.6	6.4			--	--	450	420	7.4	6.9	--	--	--	--
6..	1000	880	7.0	6.6			--	--	330	280	7.4	7.3	--	--	--	--
7..	880	840	7.2	6.2			63	60	300	250	7.5	7.0	--	--	--	--
8..	--	--	--	--			--	--	400	300	7.1	6.7	--	--	48	46
9..	860	800	6.5	6.3			59	56	410	330	7.3	6.8	--	--	51	48
10..	850	770	6.5	6.3			61	56	--	--	--	--	--	--	--	--
11..	910	800	6.5	6.0			62	56	--	--	--	--	--	--	--	--
12..	870	800	6.4	6.1			64	57	350	240	7.3	6.7	--	--	45	42
13..	980	800	6.7	6.2			66	63	400	300	6.7	6.5	--	--	49	45
14..	1000	890	6.7	6.3			66	62	400	370	7.2	6.5	--	--	48	46
15..	990	940	7.0	6.3			65	62	460	400	7.0	6.8	--	--	48	45
16..	970	910	6.9	6.6			63	60	450	430	7.0	6.6	--	--	50	46
17..	1130	910	6.8	6.1			69	60	440	420	6.9	6.6	--	--	50	46
18..	1090	1020	6.4	6.0			69	66	440	420	6.9	6.5	--	--	46	44
19..	1040	970	6.5	6.0			69	63	490	410	6.8	6.4	--	--	48	45
20..	1080	990	6.6	6.4			66	63	490	470	6.5	6.2	--	--	51	46
21..	1100	1030	6.6	6.4			68	63	490	430	6.8	6.3	--	--	49	46
22..	1080	980	6.7	6.4			66	63	470	450	6.7	6.2	12.7	10.8	48	45
23..	1040	1000	7.1	6.7			66	61	460	420	6.7	6.3	13.5	10.2	50	45
24..	1100	1000	7.2	7.1			66	61	490	430	8.1	6.4	12.4	9.7	57	48
25..	1190	1100	7.1	6.5			72	63	490	450	6.9	6.4	10.0	9.6	57	54
26..	1090	1000	6.6	6.4			69	64	500	440	6.6	6.3	9.6	8.5	57	56
27..	1200	1000	6.8	6.4			69	63	530	500	7.2	6.4	8.5	7.2	56	52
28..	1050	900	6.9	6.7			70	63	510	450	7.0	6.6	7.2	5.3	56	51
29..	1020	1000	7.1	6.9			69	64	530	460	7.0	6.6	7.0	6.6	56	52
30..	--	--	--	--			--	--	600	500	6.8	6.1	7.5	6.7	57	54
31..	--	--	--	--			--	--	610	560	6.6	6.1	7.5	6.7	60	56
	APRIL								MAY							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..	620	330	6.7	6.2	7.7	7.2	66	58	360	320	7.2	6.6	9.9	6.0	62	57
2..	--	--	--	--	--	--	--	--	400	350	6.7	6.2	8.7	7.4	64	61
3..	360	240	8.5	6.3	--	--	50	44	430	400	6.8	6.3	7.8	6.3	69	63
4..	350	220	7.9	7.2	--	--	44	42	500	420	6.4	6.2	6.8	3.8	72	66
5..	430	330	7.4	6.8	--	--	47	42	500	490	6.4	6.2	4.5	2.1	79	72
6..	450	410	7.0	6.3	--	--	52	49	500	500	6.4	6.2	3.6	.3	82	76
7..	520	410	7.4	6.6	--	--	57	51	500	500	6.5	6.3	3.6	.2	84	82
8..	--	--	6.7	6.1	--	--	56	54	500	490	6.4	6.2	4.2	.6	84	81
9..	--	--	6.5	6.1	--	--	57	54	500	390	6.2	5.9	5.8	2.0	81	74
10..	--	--	6.3	6.1	--	--	58	56	420	400	6.3	5.5	6.3	3.6	75	72
11..	--	--	6.5	6.1	--	--	58	54	500	410	6.4	6.2	5.2	2.0	80	74
12..	--	--	6.5	5.5	--	--	58	55	590	520	6.2	6.1	3.2	.9	82	78
13..	--	--	6.5	6.1	--	--	63	57	610	440	6.6	6.1	2.7	.7	83	70
14..	--	--	6.5	6.1	2.6	2.4	70	63	440	360	6.6	6.5	7.2	2.7	70	64
15..	--	--	6.5	6.0	2.4	2.2	72	68	440	320	6.5	6.5	7.8	6.0	65	63
16..	--	--	6.1	5.7	2.6	2.2	74	68	440	330	6.5	6.4	7.6	5.7	70	64
17..	--	--	6.0	5.7	4.6	2.2	78	72	430	370	6.5	6.4	6.2	3.8	75	69
18..	--	--	6.5	5.0	5.4	.4	76	72	500	430	6.5	6.4	3.9	1.4	82	75
19..	--	--	6.4	6.0	6.3	.6	72	68	600	500	6.4	6.2	2.6	.3	87	81
20..	--	--	6.5	5.6	6.6	3.2	70	62	650	570	6.4	5.8	6.3	.6	87	82
21..	--	--	8.0	6.8	9.4	6.3	62	54	730	630	6.0	5.7	8.1	.2	90	82
22..	310	260	6.9	6.7	10.5	8.7	57	54	640	590	5.9	5.8	.4	.2	92	85
23..	280	240	6.8	6.4	9.0	7.5	59	56	670	640	6.1	5.5	--	--	93	88
24..	370	260	6.8	6.2	9.4	8.4	61	57	870	660	5.8	5.5	--	--	93	88
25..	380	340	6.6	6.1	9.3	8.6	61	60	680	610	5.7	5.7	--	--	90	85
26..	390	330	6.9	6.4	9.9	8.2	60	58	710	370	7.0	5.6	4.8	2.1	92	86
27..	400	350	6.9	6.3	9.4	7.6	62	59	--	--	--	--	--	--	--	--
28..	440	380	6.4	6.0	7.6	6.1	68	62	700	640	6.0	5.5	--	--	90	87
29..	450	340	6.9	6.0	8.9	5.4	67	59	720	690	5.8	5.7	--	--	90	87
30..	350	320	7.2	6.7	9.2	7.2	58	57	740	660	6.2	5.3	--	--	90	87
31..	--	--	--	--	--	--	--	--	720	670	5.9	5.6	--	--	87	86

## BEAVER RIVER BASIN--Continued

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

Data from continuous recorder, water year October 1963 to September 1964--Continued

Day	JUNE								JULY							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..	810	670	5.9	5.4			87	85	--	--			--	--	99	97
2..	750	700	5.9	5.3			88	84	--	--			--	--	102	96
3..	750	680	5.7	5.3			87	84	740	530			--	--	102	96
4..	730	620	5.8	5.3			92	86	720	540			2.3	0.9	99	93
5..	700	660	6.0	5.4			93	87	620	540			3.0	1.3	94	90
6..	700	620	5.6	5.3			93	91	590	540			2.7	1.5	95	91
7..	710	690	5.8	5.3			92	90	620	520			2.5	.6	95	90
8..	710	640	--	--			93	87	580	490			1.8	.4	95	92
9..	660	570	--	--			96	90	600	500			1.7	.4	97	92
10..	640	600	--	--			97	94	720	550			2.2	.4	99	93
11..	--	--	--	--			98	90	640	560			1.8	.5	99	93
12..	--	--	--	--			96	93	630	500			2.4	.9	96	86
13..	660	610	--	--			98	94	520	410			3.5	1.3	93	81
14..	660	600	--	--			97	94	660	560			1.8	.6	93	89
15..	660	610	--	--			95	89	630	430			--	--	90	83
16..	610	550	--	--			90	84	600	500			--	--	93	88
17..	640	570	--	--			94	87	590	540			2.7	.6	95	88
18..	650	610	--	--			97	90	600	560			2.8	.6	102	94
19..	680	600	--	--			100	94	600	560			2.1	.5	101	96
20..	600	490	--	--			90	83	640	580			1.7	.7	102	96
21..	580	500	6.3	5.4			90	88	--	--			2.5	.4	100	96
22..	750	510	6.6	5.9			95	88	--	--			1.8	.4	98	93
23..	660	610	--	--			100	93	--	--			1.8	.4	100	96
24..	630	550	--	--			98	91	--	--			1.6	.4	102	98
25..	730	550	6.2	5.6			98	92	--	--			2.0	.4	101	96
26..	720	590	6.2	5.9			101	93	--	--			2.5	.7	98	96
27..	700	650	6.3	5.7			100	96	--	--			3.3	1.5	99	93
28..	700	600	7.3	5.3			99	94	--	--			1.5	.8	98	94
29..	720	700	6.3	5.5			100	95	510	450			3.6	1.2	89	80
30..	700	650	--	5.2			101	97	660	480			3.0	1.6	92	85
31..	--	--	--	--			--	--	660	610			2.7	.5	95	88
	AUGUST								SEPTEMBER							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..	640	590			2.1	0.4	94	88	720	660	--	--	--	--	98	97
2..	630	580			1.7	.3	95	92	760	690	--	--	--	--	100	94
3..	--	--			--	--	--	--	720	650	--	--	--	--	100	94
4..	--	--			--	--	--	--	700	640	--	--	--	--	101	96
5..	--	--			--	--	--	--	730	660	--	--	--	--	98	95
6..	700	580			--	--	98	90	700	660	--	--	--	--	98	93
7..	700	580			--	--	99	92	720	670	--	--	--	--	98	92
8..	650	580			--	--	97	93	750	700	--	--	--	--	102	94
9..	690	560			--	--	95	90	770	730	--	--	--	--	100	95
10..	730	580			--	--	96	90	820	720	6.3	5.9	0.3	0.0	106	97
11..	650	550			--	--	98	93	--	--	6.3	6.1	1.5	.0	103	99
12..	650	400			--	--	90	85	--	--	6.2	5.6	--	--	95	93
13..	640	560			--	--	90	87	--	--	6.8	5.7	--	--	93	89
14..	650	570			--	--	93	87	--	--	6.6	5.5	2.4	1.8	93	88
15..	670	610			2.4	.8	94	88	--	--	6.7	5.9	1.9	1.0	94	92
16..	760	610			--	--	95	89	--	--	6.4	4.9	1.5	.1	96	89
17..	720	680			--	--	95	92	--	--	6.6	5.8	.9	.0	101	94
18..	790	680			--	--	94	91	--	--	6.3	5.4	.2	.1	99	95
19..	960	690			--	--	97	90	--	--	--	--	1.4	.0	97	95
20..	760	620			--	--	95	92	--	--	6.6	--	1.6	.0	95	92
21..	760	700			--	--	95	92	--	--	6.3	5.4	1.5	.7	96	91
22..	700	550			--	--	94	88	--	--	6.4	5.6	1.2	.5	97	94
23..	590	530			--	--	92	89	--	--	6.7	6.2	.9	.0	98	94
24..	660	550			--	--	95	90	--	--	6.8	6.3	--	.0	93	92
25..	730	490			--	--	97	83	--	--	6.8	5.8	--	--	97	94
26..	690	570			--	--	97	88	--	--	6.6	6.1	--	--	102	96
27..	680	560			--	--	96	92	--	--	6.9	6.2	--	--	96	89
28..	700	630			--	--	99	94	--	--	6.3	5.4	--	--	90	87
29..	710	540			--	--	101	96	--	--	--	--	--	--	91	89
30..	730	560			--	--	100	95	--	--	5.8	4.9	--	--	96	90
31..	700	660			--	--	101	98	--	--	--	--	--	--	--	--

## BEAVER RIVER BASIN--Continued

## 3-1075. BEAVER RIVER AT BEAVER FALLS, PA.

LOCATION.--At intake line to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at Beaver Falls filtration plant, Beaver County, 0.5 mile downstream from bridge on State Route 386, station 10+00, Beaver Falls, Pa.

DATA AVAILABLE.--October 1963 to September 1964.

RECORDS AVAILABLE.--Chemical analyses: July 1963 to September 1964.

Water temperatures: July 1963 to September 1964.

EXTREMES. 1963-64.--Specific conductance: Maximum daily, 781 micromhos Jan. 7; minimum daily, 203 micromhos Mar. 7.

Water temperatures: Maximum, 87°F July 26, 28-30; minimum, 34°F Jan. 14-19.

REMARKS.--Values reported for acidity are potential free and determined to pH 7.0. Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September).

Chemical analyses, in parts per million, water year October 1963 to September 1964

CHEMICAL ANALYSES, IN PARTS PER MILLION, WATER FROM OCTOBER 1960 TO SEPTEMBER 1964																						
Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carb. Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Detergent (MB AS)		
																	Calcium, magnesium	Non-carbonate				
Oct. 3, 1963.	637				0.14	54	11				52	0	146	37	15	--	348	180	137	0.0	545	6.3
Oct. 10.....	659				.32	--	--	--	--	--	--	--	183	--	--	0.24	--	--	--	0	597	6.5
Oct. 20.....	683				.31	--	--	--	--	--	--	--	180	--	--	.33	--	--	--	0	623	6.5
Oct. 22.....	602				.26	66	10				28	0	197	45	19	--	422	206	183	0	641	6.3
Nov. 5.....	634				.00	--	--	--	--	--	--	--	204	--	--	.26	--	--	--	0	676	6.8
Nov. 7.....	643				.13	62	14				60	0	166	42	20	--	394	212	163	0	623	6.6
Nov. 12.....	864				.11	70	15				44	0	204	50	22	--	454	236	200	0	700	6.0
Nov. 26.....	700				1.1	--	--	--	--	--	--	--	225	--	--	.14	--	--	--	0	690	5.9
Dec. 1.....	1420				.64	--	--	--	--	--	--	--	199	--	--	.30	--	--	--	0	640	6.3
Dec. 7.....	820				.10	57	13				48	0	155	40	3.4	--	358	196	156	0	564	6.2
Dec. 16.....	720				.34	--	--	--	--	--	--	--	191	--	--	.15	--	--	--	0	700	6.4
Dec. 24.....	700				.84	72	18				28	0	232	64	22	--	508	254	231	0	777	5.9
Jan. 1, 1964.	700				.56	--	--	--	--	--	--	--	206	--	--	.23	--	--	--	0	750	6.8
Jan. 7.....	1150				.19	68	18				76	0	206	74	22	--	516	244	182	0	781	6.3
Jan. 18.....	1300				.27	--	--	--	--	--	--	--	152	--	--	.11	--	--	--	0	554	6.6
Jan. 22.....	3590				.79	--	--	--	--	--	--	--	148	--	--	.22	--	--	--	0	513	6.6
Jan. 28.....	5160				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	501	--
Feb. 1.....	2050				.27	38	9.7				30	0	102	26	14	--	250	135	111	0	384	6.4
Feb. 7.....	2540				.44	--	--	--	--	--	--	--	145	--	--	.07	--	--	--	0	502	6.2
Feb. 15.....	1050				.24	--	--	--	--	--	--	--	142	--	--	.15	--	--	--	0	511	6.4
Feb. 20.....	1140				.39	--	--	--	--	--	--	--	157	--	--	.18	--	--	--	0	609	6.6
Feb. 29.....	859				.64	63	17				40	0	189	61	21	--	444	227	194	0	690	6.0





BEAVER RIVER BASIN--Continued  
3-1075. BEAVER RIVER AT BEAVER FALLS, PA.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

CHEMICAL ANALYSES, in parts per million, water from October 1960 to September 1964 - Continued																								
Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Detergent (MB AS)		
																		Calcium, magnesium	Non-bicarbonate					
Aug. 23, 1964	2090				0.71	--	--	--	--	--	--	174	--	--	--	0.16	--	--	165	130	0	558	6.4	0.3
Aug. 26.....	1220				.28	52	8.5			42	0	123	26		8.5	--	262	165	130	0	433	6.6	--	
Sept. 1.....	827				.52	56	12			30	0	160	34		16	--	324	189	165	0	534	6.7	--	
Sept. 5.....	789				.43	--	--	--	--	--	--	177	--	--	--	.45	--	--	--	--	570	6.5	.2	
Sept. 12.....	780				.36	--	--	--	--	--	--	178	--	--	--	.33	--	--	--	--	585	6.8	.2	
Sept. 15.....	708				.84	58	14	--	--	--	2	0	183	49	20	--	388	202	201	1	613	5.1	--	
Sept. 22.....	934				.88	--	--	--	--	--	--	183	--	--	--	.24	--	--	--	--	603	6.1	.4	

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement usually between 0700 and 0830)

Once-daily measurement usually between 0700 and 0800																																
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	68	67	67	67	67	66	65	66	66	65	64	64	63	63	63	64	64	65	65	66	66	66	65	65	63	63	62	65
November.....	61	59	59	56	56	55	54	66	62	65	56	54	53	52	52	52	52	53	53	53	55	54	55	55	55	55	55	55	53	50	--	56
December.....	50	50	48	43	43	45	45	45	45	45	43	42	41	40	40	40	39	38	37	36	36	35	37	37	37	37	38	39	38	41	41	
January.....	39	38	36	36	36	39	43	41	42	41	40	40	35	34	34	34	34	34	38	40	39	39	39	39	39	39	36	35	36	35	37	
February.....	35	35	38	36	37	40	40	40	--	39	38	38	38	38	--	39	39	39	41	37	39	39	39	39	39	40	41	39	39	--	39	
March.....	40	42	40	44	44	59	40	40	42	43	41	39	40	40	40	42	43	44	43	41	42	42	43	42	43	43	43	43	45	43	42	
April.....	42	43	44	43	43	42	45	47	45	46	44	47	55	54	55	55	55	56	56	58	58	57	58	58	59	58	59	58	60	60	--	52
May.....	60	59	59	60	62	64	66	66	68	70	68	68	67	65	62	63	65	67	69	70	68	70	70	73	72	74	73	72	72	72	72	72
June.....	68	67	67	67	67	69	74	72	74	75	76	76	76	76	77	77	77	77	77	77	77	76	77	78	78	80	80	80	79	80	--	75
July.....	80	82	82	82	--	82	82	80	81	80	80	80	80	78	74	75	77	77	79	83	84	83	83	86	86	87	86	87	87	83	82	83
August.....	83	82	84	82	81	81	78	79	80	78	81	80	75	78	78	78	73	78	73	75	76	76	76	77	77	77	77	79	78	82	79	82
September.....	83	82	80	80	80	80	80	79	79	79	79	79	78	73	73	74	73	74	74	75	75	76	76	73	73	73	71	69	69	--	76	

OHIO RIVER MAIN STEM  
3-1096. OHIO RIVER AT EAST LIVERPOOL, OHIO

LOCATION.--At intake line to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at East Liverpool filtration plant, Columbiana County, 0.6 mile downstream from Little Beaver Creek.

DRAINAGE AREA.--23,500 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: July 1963 to September 1964.

Water temperatures: July 1963 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 696 micromhos Nov. 10; minimum daily, 150 micromhos Mar. 8.

Water temperatures: Maximum, 85°F July 28; minimum, freezing point on several days during December and January.

REMARKS.--Analyses reported for conductivity determined to pH 0.0. Daily samples were collected at this station and records of specific conductance of daily samples are available in district office records at Columbus, Ohio. Samples were analyzed by the following methods: (1) maximum daily specific conductance for each month, and (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September).

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Detergent pH (MB AS)	
																		Calcium, magnesium	Non-carbonate			
Oct. 1, 1963.					0.54	46	11				8	0	180	32	9.5	---	343	160	154	---	546	5.8
Oct. 8.....					.67	--	--				---	205	--	--	---	0.12	---	---	---	---	600	5.6
Oct. 20.....					.39	--	--				---	191	--	13	---	.14	---	---	---	---	597	5.8
Oct. 30.....					.50	52	12				16	0	213	43	---	---	400	179	166	---	629	5.9
Nov. 10.....					.84	58	14				8	0	241	40	2.9	---	459	202	196	0.0	696	5.7
Nov. 11.....					.05	--	--				---	240	--	---	---	.27	---	---	---	---	687	5.8
Nov. 23.....					.70	--	--				---	154	--	---	---	.08	---	---	---	---	486	6.0
Nov. 27.....					.00	39	10				28	0	126	40	5.9	---	286	139	116	0.0	459	6.1
Dec. 3.....					.54	40	11				8	0	169	24	6.4	---	291	145	139	1.1	472	5.4
Dec. 11.....					.27	--	--				---	134	--	---	---	.12	---	---	---	---	405	6.1
Dec. 14.....					.12	25	6.3				12	0	82	22	4.8	---	168	88	78	0.0	298	6.0
Dec. 31.....					.28	--	--				---	113	--	---	---	.04	---	---	---	---	387	6.0
Jan. 7, 1964.					.50	--	--				---	121	--	---	---	.26	---	---	---	---	420	5.7
Jan. 17.....					.66	36	10				18	0	129	36	8.2	---	275	131	116	0.0	444	7.0
Jan. 21.....					1.6	--	--				---	90	--	---	---	.08	---	---	---	---	319	6.6
Jan. 23.....					.79	--	--				---	97	--	---	---	.06	---	---	---	---	334	6.3
Jan. 27.....					1.4	--	--				---	72	--	---	---	.12	---	---	---	---	264	6.1
Jan. 30.....					1.1	18	5.4				14	0	53	16	4.6	---	123	67	56	0.0	202	6.4
Feb. 1.....					.76	19	5.6				8	0	61	12	4.8	---	142	70	64	---	208	6.0
Feb. 8.....					.32	--	--				---	97	--	---	---	.10	---	---	---	---	302	6.0
Feb. 14.....					.44	--	--				---	99	--	---	---	.06	---	---	---	---	313	5.3
Feb. 22.....					1.0	--	--				---	126	--	---	---	.12	---	---	---	---	377	5.7
Feb. 28.....					1.1	35	10				6	0	132	23	7.5	---	254	129	124	---	397	5.8



Temperature (°F) of water, water year October 1963 to September 1964

Temperature (°F) of water, water year October 1963 to September 1964																																	
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		
Oct. 3, 1964.							38	44	9.2							26	0	141	32		4.5							302	148	127		457 6.5	
Sept. 10.....							.50	--	--	--						--	--	153	--	--	--	--	--	--	--	.19	--	--	--	--	--	481 6.8	
Sept. 19.....							.62	--	--	--						--	--	166	--	--	--	--	--	--	--	.13	--	--	--	--	--	512 6.2	
Sept. 26.....							.38	--	--	--						10	0	179	--	--	--	--	--	--	--	.15	--	362	179	171	--	545 5.8	
Sept. 30.....							1.3	52	12									193	39		11					--	--	--	--	--	--	587 5.9	
October.....	68	70	71	70	70	70	70	70	70	70	70	70	69	--	68	68	67	--	67	67	67	67	67	--	--	--	67	67	67	65	--	68	
November.....	--	--	--	--	--	--	61	--	60	59	58	58	58	--	--	55	54	53	54	53	--	--	55	54	53	--	53	53	53	54	--	--	68
December.....	52	55	47	45	44	44	44	44	43	43	42	--	--	39	40	38	37	37	35	--	--	52	52	--	52	54	--	34	34	--	34	35	40
January.....	35	--	33	34	34	--	39	39	--	40	35	33	32	32	--	32	32	--	33	33	--	35	35	40	--	32	34	--	32	32	--	--	--
February.....	36	--	33	34	34	--	36	36	--	35	--	--	--	35	36	36	36	36	--	36	35	--	35	36	36	--	36	36	--	36	36	--	--
March.....	--	--	--	--	--	38	--	35	36	37	40	40	42	--	40	40	40	--	41	40	39	--	40	40	--	--	42	42	42	42	42	--	--
April.....	43	42	40	40	--	42	--	--	44	44	44	44	46	47	--	50	50	--	54	55	--	58	55	55	55	56	57	58	60	60	--	50	
May.....	60	60	60	60	62	63	64	62	64	--	66	66	68	--	64	64	65	65	70	69	--	68	--	70	70	72	75	76	75	75	--	67	
June.....	75	--	72	69	68	70	--	72	--	73	--	73	--	74	75	--	80	78	--	75	75	78	--	--	--	78	78	78	78	--	--	--	67
July.....	82	80	80	80	--	80	80	82	80	80	78	80	79	--	80	78	78	78	80	--	84	82	82	82	84	--	84	--	85	82	83	81	81
August.....	83	82	83	82	82	82	80	80	78	78	78	78	77	76	76	--	76	--	--	74	74	75	75	75	78	--	76	74	76	76	78	78	78
September.....	78	--	78	78	78	78	78	--	79	78	78	78	78	76	76	75	74	74	74	--	74	74	74	75	75	72	70	72	72	70	70	--	75

## MUSKINGUM RIVER BASIN

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

LOCATION.---At gaging station (on right bank) at highway bridge, 0.8 mile south of Newcomerstown, Tuscarawas County, 2 miles upstream from Buckhorn Creek, and DRAINAGE AREA 2,436 square miles.

RECORDS AVAILABLE.---Chemical analyses: July 1946 to September 1948, October 1955 to September 1959, October 1960 to September 1964. Chloride: July 1946 to May 1949, October 1957 to September 1964.

Hardness: October 1957 to September 1960.

Specific conductance: July 1946 to September 1964, October 1955 to September 1964.

Water temperatures: July 1946 to May 1949, October 1955 to September 1964.

EXTREMES, 1963-64.---Specific conductance: Maximum daily, 4,360 micromhos Oct. 2; minimum daily, 270 micromhos Mar. 11.

Water temperatures: Maximum, 85°F July 20, 27; minimum, freezing point on many days during December and January.

EXTREMES, 1946-49, 1953-64.---Specific conductance: Maximum daily, 6,530 micromhos Sept. 21, 1946; minimum daily, 230 micromhos Mar. 6, 1963.

REMARKS.---Samples for iron and manganese were collected at this station and samples were selected for analysis as follows: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, (3) special sample each month to further define quality of water, and (4) composite analysis of all daily samples.

## Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Fe)	Iron (Mn)	Manganese (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific acid-ance (micro-mhos at 25°C)	pH or Col-	Oxygen consumed	
																	Calcium, magnesium	Non-carbonate			Filler	
Oct. 2, 1963.	320										232	1200	1.8	13		2650	1070	971	4360	6.7		
Oct. 22.....	843										137	330	.9	6.5		1040	446	343	1580	6.8		
Oct. 24.....	843		0.17	0.39											0.00						2	3
Oct. 1-31....	594										198	680	1.4	7.8		1780	700	581	2730	7.0		
Nov. 2.....	852										160	380	.8	8.8		1110	475	376	1730	7.3		
Nov. 24.....	330										218	1200	2.2			2800	1050	910	4320	7.1		
Nov. 27.....	320		.26	.22											.26						3	3
Nov. 1-28....	530										180	730	1.4	13		1850	710	590	2880	7.0		
Dec. 3.....	426										164	188	1.4			2720	945	810	3680	6.6		
Dec. 6.....	330										204	620	1.5	2.9		1860	636	526	2560	7.0		
Dec. 20.....	290		.88	.91											.30						2	3
Dec. 1-17....	379										212	800	1.5	20		2330	788	665	3080	7.0		
Jan. 23, 1964	1400		.49	.98											.16						1	4
Jan. 27.....																						
Jan. 31.....	965										196	340	.6	13		1170	462	396	1610	6.8		
Feb. 2.....	794										193	382	1.1	16		1080	474	400	1760	6.8		
Feb. 18.....	518										210	800	1.8	20		1840	844	750	3050	7.3		
Feb. 25.....	509		.66	1.6											.15						2	2
Feb. 1-29....	614										220	620	1.1	15		1620	676	576	2590	6.8		



MUSKINGUM RIVER BASIN--Continued  
 3-1290. TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO--Continued  
 Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Chemical analyses, in parts per million, water, for October 1963 to September 1964—Continued										
Date of collection	Dissolved oxygen		Organics		Ammonia nitrogen as NH <sub>4</sub>	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbidity	Threshold odor	
	Parts per million	Percent saturation	Phenols as C <sub>6</sub> H <sub>5</sub> OH	Alkyl benzene sulfonate (ABS)						
Oct. 24, 1963.....	7.9	82		0.2					--	
Nov. 27.....	7.2	60		.4				--	0	
Dec. 20.....	4.2	29		.3				6	0	
Jan. 23, 1964.....	7.1	49		.2				60	C-32	
Feb. 25.....	7.5	54		.2				15	C-8	
Mar. 26.....	9.0	74		.1				90	M-2	
Apr. 24.....	7.0	70		.1				30	E-1	
June 3.....	8.4	87		.2				8	M-1	
July 7.....	11.4	131		.2				20	0	
Aug. 20.....	12.2	133		.2				15	E-2	
Sept. 25.....	13.1	135		.3				7	M-4	

## MUSKINGUM RIVER BASIN--Continued

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

Specific conductance and chloride, in parts per million,  
water year October 1963 to September 1964

Day	October		November		December		January	
	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)
1	3980	1050	1750	390	3570	930	--	--
2	4360	1200	1730	380	3470	900	--	--
3	3850	1020	1790	410	3680	1000	--	--
4	2840	675	1820	410	3030	750	--	--
5	3080	800	1870	430	2620	630	--	--
6	3210	825	2100	500	2560	620	--	--
7	3240	825	1960	450	2710	660	--	--
8	3330	875	2120	520	2780	690	--	--
9	3590	950	1800	400	2960	740	--	--
10	3590	975	2100	500	3220	830	--	--
11	3420	900	2070	500	3220	840	--	--
12	3660	1000	2240	540	3310	870	--	--
13	3590	1000	2650	700	3250	840	--	--
14	3590	975	3100	800	3010	740	--	--
15	3700	1000	3130	825	3030	760	--	--
16	3450	925	3100	825	3280	860	--	--
17	3050	760	3080	800	3340	860	--	--
18	2470	580	3360	875	--	--	--	--
19	1660	350	3460	925	--	--	--	--
20	1660	360	3780	1000	--	--	--	--
21	1600	346	4080	1150	--	--	--	--
22	1580	330	4080	1100	--	--	--	--
23	1650	364	4220	1175	--	--	--	--
24	1710	380	4320	1200	--	--	--	--
25	1730	380	4220	1150	--	--	1270	216
26	1640	360	3990	1100	--	--	1150	198
27	1660	360	4170	1175	--	--	1050	175
28	1690	374	--	--	--	--	1090	230
29	1690	370	--	--	--	--	1200	195
30	1820	410	--	--	--	--	1300	250
31	1820	420	--	--	--	--	1610	340

Day	February		March		April		May	
	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)
1	2030	468	2930	700	780	113	976	172
2	1760	382	2950	720	881	144	909	144
3	2230	530	2670	620	785	112	940	153
4	2150	480	1380	255	770	125	1110	206
5	2540	620	626	62	887	175	1170	221
6	2340	540	668	102	799	140	1190	222
7	2570	620	883	180	801	135	1100	191
8	2340	540	986	205	803	132	1210	224
9	2520	610	795	140	1020	202	1350	268
10	2610	630	357	20	1010	190	1350	260
11	2590	630	270	12	1240	260	1540	325
12	2470	600	298	15	1250	260	1340	250
13	2370	560	604	80	1210	240	1330	250
14	2150	490	1080	240	1190	230	1380	258
15	2330	540	1600	400	1320	260	1480	300
16	2570	620	1580	388	1260	250	1660	395
17	2670	660	1300	290	1190	220	1900	470
18	3050	800	1020	208	1370	280	1680	375
19	2950	750	960	180	1270	230	1310	268
20	2900	730	842	150	953	162	1310	268
21	2860	720	661	100	711	106	1330	265
22	2900	740	587	80	840	168	1380	270
23	2590	620	588	78	832	158	1420	280
24	2690	660	643	92	1150	270	1620	345
25	3000	780	572	64	1470	360	1660	355
26	3000	770	654	68	1790	460	1740	372
27	2750	660	612	79	1100	220	1710	362
28	2810	700	637	84	943	172	1740	380
29	2950	740	625	84	1400	320	1800	395
30	--	--	651	82	1590	370	1500	292
31	--	--	705	94	--	--	1820	405



## MUSKINGUM RIVER BASIN--Continued

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

Specific conductance and chloride, in parts per million,  
water year October 1963 to September 1964--Continued

Day	June		July		August		September	
	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)
1	1820	380	1980	460	3010	790	2590	660
2	1700	330	1870	420	2570	640	3020	800
3	1800	370	1880	410	2400	540	3200	850
4	1790	350	1960	440	1950	430	3090	810
5	1850	380	2130	500	2030	480	2990	780
6	1820	380	2150	510	2240	560	2640	650
7	1860	370	2220	520	2220	540	2920	740
8	1530	280	2410	590	1590	340	3070	820
9	1500	300	2640	660	1880	420	3150	850
10	1180	200	2580	650	1960	460	3350	920
11	1060	190	2580	650	2060	480	3320	900
12	1430	300	2460	600	1770	360	3920	1100
13	1570	320	2680	670	1220	210	4010	1120
14	1570	320	2220	520	1810	390	3580	980
15	1320	240	2030	440	1940	440	3760	1040
16	1230	220	1570	300	3370	920	3540	970
17	1290	240	1720	340	3400	940	3350	880
18	1290	240	2150	500	2660	660	3580	960
19	1530	320	2160	520	1640	320	3970	1120
20	1860	430	2100	480	1640	310	4010	1100
21	1120	180	2000	440	2400	580	3510	940
22	1120	180	2600	660	2600	640	3440	920
23	831	130	2600	650	2600	640	3380	900
24	973	160	2600	640	2600	640	3410	920
25	1060	180	2050	480	2600	620	3320	880
26	1340	260	1970	460	2530	620	3090	810
27	1390	280	2180	536	2510	600	3200	830
28	1410	290	2400	590	2680	680	3410	900
29	1650	360	2060	480	3220	850	3650	990
30	1910	450	2500	600	3220	860	3540	960
31	--	--	3030	820	3160	840	--	--

MUSKINGUM RIVER BASIN--Continued  
 3-1290. TUSCARAWAS RIVER AT NEWCOMERTOWN, OHIO--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964  
 (Once-daily measurement, at 1800)

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



## MUSKINGUM RIVER BASIN--Continued

3-1390. KILLBUCK CREEK AT KILLBUCK, OHIO--Continued

Suspended sediment, water year October 1963 to September 1964

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..	27	27	2.0	34	24	2.2	44	11	1.3
2..	27	37	2.7	43	16	1.8	42	14	1.6
3..	26	47	3.3	42	12	1.4	40	13	1.4
4..	26	36	2.5	36	7	.7	40	13	1.4
5..	26	26	1.8	35	17	1.6	40	16	1.7
6..	26	37	2.6	35	28	2.6	40	15	1.6
7..	25	46	3.1	39	30	3.2	40	14	1.5
8..	25	48	3.2	43	25	2.9	43	14	1.6
9..	25	34	2.3	41	16	1.8	49	14	1.8
10..	25	31	2.1	39	16	1.7	53	13	1.9
11..	25	38	2.6	39	14	1.5	51	13	1.8
12..	28	43	3.2	40	8	.9	51	10	1.4
13..	25	38	2.6	40	8	.9	48	13	1.7
14..	26	23	1.6	39	7	.7	46	23	2.8
15..	26	22	1.5	38	9	.9	40	14	1.5
16..	25	37	2.5	37	13	1.3	35	10	.9
17..	26	45	3.2	37	15	1.5	33	7	.6
18..	26	43	3.0	36	24	2.3	32	9	.8
19..	31	34	2.8	35	23	2.2	30	6	.5
20..	28	30	2.3	35	13	1.2	30	7	.6
21..	26	34	2.4	36	21	2.0	30	10	.8
22..	24	39	2.5	35	30	2.8	30	9	.7
23..	26	34	2.4	36	30	2.9	32	9	.8
24..	28	30	2.3	36	15	1.4	32	9	.8
25..	28	34	2.6	34	13	1.2	34	9	.8
26..	28	35	2.6	33	5	.4	34	9	.8
27..	30	35	2.8	32	10	.9	34	9	.8
28..	28	35	2.6	33	13	1.2	32	9	.8
29..	28	27	2.0	39	14	1.5	32	9	.8
30..	30	15	1.2	48	13	1.7	32	10	.9
31..	31	13	1.1	--	--	--	32	10	.9
Total	831	--	75.4	1125	--	49.3	1181	--	37.3
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..	32	10	0.9	100	4	1.1	60	12	1.9
2..	34	10	.9	95	5	1.3	110	16	5
3..	36	10	1.0	88	6	1.4	473	90	120
4..	38	13	1.3	80	7	1.5	714	434	1060
5..	44	9	1.1	75	14	2.8	2440	980	5900
6..	48	11	1.4	90	19	4.6	2250	63	383
7..	55	33	4.9	140	18	6.8	1890	67	342
8..	60	18	2.9	121	12	3.9	1800	70	340
9..	72	6	1.2	110	10	3.0	2800	690	5220
10..	107	9	2.6	100	6	1.6	7670	376	7790
11..	90	3	.7	87	6	1.4	6240	209	3740
12..	75	4	.8	80	7	1.5	3450	113	1050
13..	65	2	.4	74	6	1.2	3480	96	902
14..	60	2	.3	72	6	1.2	2980	105	845
15..	55	1	.1	68	6	1.1	2490	105	706
16..	55	2	.3	68	6	1.1	1940	99	518
17..	55	6	.9	65	7	1.2	1540	96	399
18..	55	13	1.9	65	9	1.6	1240	65	218
19..	60	12	1.9	65	8	1.4	962	40	104
20..	90	16	3.9	65	7	1.2	725	37	72
21..	150	21	8.5	60	8	1.3	705	67	128
22..	220	27	16	60	9	1.4	812	63	138
23..	270	16	12	60	9	1.4	757	62	127
24..	343	14	13	60	11	1.8	717	67	130
25..	405	16	17	62	6	1.0	642	66	114
26..	373	20	20	61	4	.6	602	63	102
27..	289	12	9.4	62	5	.8	536	42	61
28..	198	8	4.3	62	6	1.0	494	24	32
29..	152	11	4.5	61	7	1.2	455	23	28
30..	136	7	2.6	--	--	--	423	18	20
31..	116	4	1.2	--	--	--	399	22	24
Total	3838	--	137.9	2256	--	51.4	51796	--	30619.9

S Computed by subdividing day.

B Computed from estimated-concentration graph.

## MUSKINGUM RIVER BASIN--Continued

## 3-1390. KILLBUCK CREEK AT KILLBUCK, OHIO--Continued

## Suspended sediment, water year October 1963 to September 1964--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..	378	18	18	1330	56	201	254	55	38
2..	434	36	49	1240	43	144	236	52	33
3..	1290	627	2350	1080	43	125	223	41	25
4..	1580	185	789	891	49	118	216	55	32
5..	1440	145	564	713	58	112	211	88	50
6..	1460	109	430	587	67	106	205	68	38
7..	1440	64	249	510	60	83	208	75	42
8..	1270	44	151	457	66	81	244	93	61
9..	1040	49	138	412	56	62	255	75	52
10..	801	46	99	368	42	42	240	57	37
11..	627	47	80	340	47	43	205	55	30
12..	531	43	62	331	45	40	178	52	25
13..	481	43	56	334	50	45	160	45	19
14..	448	43	52	628	220	373	148	43	17
15..	403	43	47	697	96	181	170	47	22
16..	366	41	40	620	78	130	248	79	53
17..	340	41	38	796	568	1320	201	63	34
18..	319	38	33	734	268	531	180	64	31
19..	510	83	130	603	145	236	168	66	30
20..	1250	1080	4420	512	110	152	159	52	22
21..	3150	300	2550	430	116	135	153	37	15
22..	2800	445	3360	379	92	94	155	48	20
23..	2720	205	1510	342	64	59	144	59	23
24..	2380	156	1000	394	--	320	149	69	31
25..	2160	153	892	524	E	600	140	74	28
26..	1830	110	544	446	E	207	122	62	20
27..	1450	67	262	434	112	131	111	51	15
28..	1350	56	204	374	96	97	101	53	14
29..	1310	82	290	328	83	74	93	54	14
30..	1300	83	291	292	57	45	88	47	11
31..	--	--	--	266	44	32	--	--	--
Total	36858	--	20698	17392	--	5919	5385	--	882
	JULY			AUGUST			SEPTEMBER		
1..	86	36	8.4	65	48	8.4	47	44	5.6
2..	83	34	7.6	91	--	70	47	39	4.9
3..	80	37	8.0	261	E	750	46	47	5.8
4..	86	37	8.6	185	E	114	44	39	4.6
5..	78	38	8.0	169	144	66	43	31	3.6
6..	72	32	6.2	140	123	46	41	36	4.0
7..	70	32	6.0	109	135	40	40	28	3.0
8..	73	35	6.9	87	97	23	39	29	3.0
9..	79	42	9.0	72	79	15	38	32	3.3
10..	81	37	8.1	65	118	21	38	34	3.5
11..	71	33	6.3	66	115	20	38	34	3.5
12..	88	46	11	236	850	550	38	24	2.5
13..	114	56	17	186	329	165	37	18	1.8
14..	97	64	17	153	198	82	36	24	2.3
15..	98	106	28	118	117	37	36	23	2.2
16..	137	90	33	92	95	24	37	20	2.0
17..	118	57	18	77	118	24	37	23	2.3
18..	101	115	31	70	106	20	38	34	3.5
19..	87	84	20	65	92	16	41	37	4.1
20..	77	100	21	64	89	15	42	32	3.6
21..	75	86	17	81	89	19	43	32	3.7
22..	92	94	23	92	77	19	42	32	3.6
23..	108	82	24	89	56	13	41	38	4.2
24..	96	130	34	77	64	13	39	33	3.5
25..	82	77	17	69	62	12	38	24	2.5
26..	72	50	10	70	53	10	37	26	2.6
27..	65	54	9.5	63	53	9.0	37	24	3.4
28..	61	70	12	57	43	6.6	37	27	2.7
29..	77	76	16	54	33	4.8	37	21	2.1
30..	93	83	21	51	34	4.7	37	26	2.6
31..	77	72	15	49	37	4.9	--	--	--
Total	2674	--	477.6	3123	--	2222.4	1191	--	100.0
Total discharge for year (cfs-days).....									127650
Total load for year (tons).....									61270.2

E Estimated.

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

MUSKINGUM RIVER BASIN--Continued  
 3-1390. KILLBUCK CREEK AT KILLBUCK, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964  
 (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)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment con- cen- tration (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. 5, 1964.....	1100			2620	1070		45	56	66	74	86	91	99	100				SBMC
Mar. 9.....	0830			2080	1260		29	41	50	65	82	93	97	100				SBMC
Mar. 9.....	0830			2080	1260		5	21	34	50	74	79	96	99	100			SBN
Apr. 3.....	1015			1240	926		35	47	59	72	87	94	99	100				SBMC
Apr. 3.....	1015			1240	926		11	26	41	61	83	86	98	100				SBN
Apr. 20.....	1730			1580	2340		25	34	46	58	80	91	99	100				SBMC
Aug. 12.....	1730			238	575		55	69	84	92	98	99	100	--				SBMC

## 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 1964.

REMARKS.--Samples collected for iron and manganese were filtered clear when collected.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>	Total acidity as H <sup>+</sup>	Specific conductance (micro-mhos at 25°C)	pH	Color
Oct. 24, 1963.		8.1		0.22	4.5	93	27	246	4.9	130	12	550	0.1	1.1	1100	343	227	1870	7.0	5
Nov. 23.....		7.4		1.1	21	41	27	124	2.7	124	20	54			266	147	147	1874	7.3	10
Dec. 20.....		7.5		1.1	14	58	18	32	2.2	146	88	54			334	219	99	1875	7.2	10
Jan. 23, 1964.		5.8		2.20	21	36	9.7	9.1	2.4	52	86	13			211	130	88	322	6.8	5
Feb. 25.....		5.7		.42	12	48	13	18	1.5	82	104	30			288	174	107	448	6.6	10
Mar. 26.....		7.6		.32	21	30	7.7	7.7	1.8	50	69	8.0			167	107	66	262	7.0	2
Apr. 24.....		7.7		.22	.03	25	6.6	6.0	1.7	42	58	4.0			134	90	55	211	6.3	5
June 3.....		4.8		.55	19	49	14	19	2.2	90	110	27			281	180	106	451	6.8	4
Aug. 20.....		5.6		.35	.34	41	11	24	2.9	94	60	41			232	147	70	422	7.2	7
Sept. 17.....		5.1		.34	.71	65	19	76	3.2	110	78	163			479	240	150	877	7.3	5

Date of collection	Dissolved oxygen		Organics		Ammonia nitrogen as NH <sub>4</sub>	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols C <sub>6</sub> H <sub>5</sub> OH	Alkyl benzene sulfonate (ABS)					
Oct. 24, 1963.....	2.4	24		--				15	C-4
Nov. 23.....	6.6	35		--				--	0
Dec. 20.....	10.3	72		--				20	0
Jan. 23, 1964.....	10.3	72		--				4	0
Feb. 25.....	9.8	68		--					
Mar. 26.....	9.6	81		0.0				20	0
Apr. 24.....	7.8	78		0.0				20	0
June 3.....	9.2	92		0.0				14	0
Aug. 20.....	8.4	88		0.0				20	0
Sept. 17.....	6.8	68		.1				10	Dp-4

MUSKINGUM RIVER BASIN--Continued  
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.  
DATE, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964.  
RECORDS AVAILABLE.--Water temperatures: October 1952 to September 1960; October 1961 to September 1963, unpublished; October 1963 to September 1964.  
Sediment records: October 1952 to September 1964.  
EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 850 ppm Mar. 5; minimum daily, 5 ppm Feb. 25-28, Mar. 1.  
Sediment loads: Maximum daily, 46,400 tons Mar. 5; minimum daily, 12 tons Feb. 25.  
EXTREMES, 1952-64.--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 1952-54, 1956, and 1960.  
REMARKS.--Flow regulated by 14 flood-control reservoirs.

Chemical analyses, in parts per million, water year October 1963 to September 1964.--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbocationate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific conductance (microhm-cm at 25°C)	Dissolved oxygen	
																			Calcium, magnesium	Non-carbonate			
Oct. 21, 1963														360					1160	520	397	1710	
Sept. 21, 1964														460	0.9	1.8					1820	8.1	

Temperature (°F) of water, water year October 1963 to September 1964

Temperature (° F.) of Water, Water Year October 1963 to September 1964																															
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.....	--	--	--	--	--	--	--	69	--	--	--	--	--	67	--	--	--	--	--	63	--	--	--	--	--	65	--	--	--	--	--
November.....	--	45	--	--	--	--	--	44	--	--	--	--	--	--	40	--	55	--	--	--	--	--	42	--	51	--	--	--	--	--	--
December.....	40	--	--	--	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January.....	--	34	--	--	--	42	42	42	42	40	40	42	43	44	44	42	43	42	--	--	--	--	39	--	--	34	--	--	--	--	--
February.....	--	45	--	41	40	41	42	43	42	40	40	42	43	44	44	42	43	42	--	--	42	43	44	46	--	43	44	44	43	42	43
March.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	--	--	35	--	--	--	--	--	--	--	--	--	--	--	--	--
April.....	43	43	--	42	43	44	47	48	49	49	49	52	53	55	55	57	57	57	57	59	58	59	59	60	60	59	60	61	60	--	55
May.....	59	61	62	63	64	66	66	66	67	65	65	63	62	59	52	48	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
June.....	61	--	--	--	--	--	--	58	--	--	--	--	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
July.....	--	--	--	--	--	75	--	--	--	80	--	74	--	--	--	--	--	80	--	--	--	--	--	--	--	80	--	--	--	--	--
August.....	--	--	79	78	--	--	--	--	74	--	--	--	--	--	70	--	--	--	--	--	--	74	--	--	--	--	--	--	--	--	--
September.....	--	--	--	--	--	83	--	--	--	--	--	76	--	--	--	--	--	--	--	78	--	--	--	--	--	67	--	--	--	--	--



## MUSKINGUM RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964  
(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..	486	10	13	1430	15	58	920	14	35
2..	502	10	14	1420	15	58	940	15	38
3..	622	9	15	1460	14	55	860	16	37
4..	590	9	14	1450	14	55	805	15	33
5..	558	9	14	1430	14	54	760	15	31
6..	558	9	14	1400	14	53	715	15	29
7..	574	9	14	1440	15	58	688	15	28
8..	574	9	14	1430	15	58	688	15	28
9..	574	9	14	1450	15	59	706	15	28
10..	582	10	16	1360	15	55	715	15	29
11..	598	10	16	1190	14	45	760	15	31
12..	598	10	16	1050	14	40	787	14	30
13..	606	10	16	1000	12	32	796	15	32
14..	614	11	18	970	11	29	742	15	30
15..	606	13	21	890	10	24	590	15	24
16..	582	13	20	805	10	22	590	15	24
17..	639	14	24	751	9	18	583	15	24
18..	960	14	36	706	9	17	614	15	25
19..	1160	16	50	662	8	14	555	15	22
20..	1240	17	57	638	8	14	506	15	20
21..	1280	19	66	654	9	16	485	14	18
22..	1270	18	62	630	10	17	485	13	17
23..	1280	17	59	622	10	17	485	12	16
24..	1290	17	59	606	10	16	506	12	16
25..	1300	17	60	646	11	19	520	12	17
26..	1300	17	60	724	12	23	520	12	17
27..	1290	18	63	742	12	24	555	13	19
28..	1290	19	66	751	12	24	555	14	21
29..	1320	18	64	832	12	27	555	15	22
30..	1340	17	62	870	13	30	548	15	22
31..	1390	17	64	--	--	--	520	15	21
Total	27573	--	1101	30009	--	1031	20054	--	784
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..	527	15	21	1630	--	65	1000	5	14
2..	513	15	21	1460	--	45	1190	9	29
3..	520	15	21	1360	11	40	2130	30	172
4..	569	15	23	1270	10	34	5820	169	3350
5..	638	13	22	1200	10	32	20200	850	46400
6..	742	12	24	1200	10	32	25000	431	29100
7..	814	10	22	1420	10	38	15600	256	10800
8..	870	10	23	1680	10	45	14900	187	7520
9..	1040	10	28	1920	10	52	17800	332	17200
10..	1260	10	34	1840	9	45	32700	487	43000
11..	1400	10	38	1550	9	38	36800	251	24900
12..	1610	10	43	1370	9	33	25700	208	14400
13..	1370	10	37	1300	9	32	18400	188	9340
14..	1040	12	34	1220	9	30	23800	166	10700
15..	841	13	30	1100	9	27	27500	170	12600
16..	940	14	36	1100	9	27	28900	112	8740
17..	1050	14	40	1050	8	23	28700	101	7830
18..	990	14	37	1050	8	23	29300	100	7910
19..	950	14	36	1100	9	27	29300	94	7440
20..	990	14	37	1130	9	27	29000	90	7050
21..	1170	--	50	1140	8	25	28600	82	6330
22..	1660	--	90	1080	7	20	28600	75	5790
23..	2500	--	160	1000	6	16	28500	72	5540
24..	3180	--	220	1010	6	16	27900	64	4820
25..	4090	--	490	930	5	12	27700	60	4490
26..	4900	--	1400	970	5	13	27800	55	4130
27..	4720	110	1400	970	5	13	27400	52	3850
28..	3610	--	700	970	5	13	26200	45	3180
29..	2640	--	210	990	6	16	25000	37	2500
30..	2020	--	100	--	--	--	24400	37	2440
31..	1870	--	80	--	--	--	23600	44	2800
Total	51034	--	5507	36010	--	859	709440	--	314365

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

## MUSKINGUM RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..	22100	40	2390	22100	52	3100	2870	23	178
2..	21800	40	2350	19800	54	2890	2720	27	198
3..	24000	100	6480	17500	62	2930	2600	27	190
4..	24500	141	9330	15400	55	2290	2450	27	179
5..	26800	111	8030	13900	48	1800	2420	27	176
6..	27300	94	6930	13100	46	1630	2450	28	185
7..	26000	73	5120	12500	41	1380	2480	30	201
8..	23400	71	4480	11700	45	1420	3050	40	330
9..	22100	66	3940	10900	38	1120	2780	--	900
10..	21400	72	4160	10800	38	1110	4250	--	600
11..	19100	73	3760	10300	40	1110	3370	--	380
12..	13300	130	4670	8510	37	850	2810	--	260
13..	10900	81	2380	5620	58	880	2480	--	180
14..	9660	58	1810	5950	110	1800	2290	--	140
15..	8530	59	1360	10100	--	7400	3260	78	686
16..	7640	53	1090	10200	134	3690	5600	127	1920
17..	6650	46	826	8730	96	2260	5510	143	2130
18..	5080	42	678	8780	98	2320	4670	92	1160
19..	5910	40	638	7770	84	1760	4070	82	901
20..	10700	270	7800	6750	67	1220	4050	72	787
21..	22800	460	27000	5950	56	900	3640	60	590
22..	23300	225	14200	5280	48	684	4250	68	780
23..	24300	150	9840	4640	45	564	5030	105	1430
24..	24700	132	8800	4100	35	387	5280	117	1670
25..	24600	145	9630	4130	40	446	4780	98	1260
26..	24200	80	5230	4440	40	480	3960	83	887
27..	23900	67	4320	4100	39	432	3280	62	549
28..	23800	67	4300	4130	37	412	2760	43	320
29..	21700	62	3970	3670	35	347	2440	36	237
30..	22900	68	4200	3290	34	302	2200	35	208
31..	--	--	--	3020	29	236	--	--	--
Total	575070	--	164412	277160	--	48150	105800	--	19612
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..	1980	35	187	1130	19	58	832	17	38
2..	1820	35	172	1070	18	52	796	17	36
3..	1750	30	142	2020	32	174	787	17	36
4..	1620	27	118	2860	87	672	769	19	39
5..	1520	24	98	3040	70	574	742	21	42
6..	1400	22	83	2750	45	334	733	24	47
7..	1300	22	77	2120	33	189	715	26	50
8..	1270	24	82	1720	27	125	697	26	49
9..	1310	25	88	1460	24	95	670	25	45
10..	1310	26	92	1290	20	70	662	24	43
11..	1290	24	84	1190	19	61	646	22	38
12..	1260	23	78	1610	--	95	638	20	34
13..	1670	21	95	2270	--	220	638	19	33
14..	1890	21	107	2150	--	200	638	23	40
15..	2050	22	122	1950	--	160	630	18	31
16..	2050	22	122	1610	27	117	622	19	32
17..	2190	22	130	1380	25	93	622	20	34
18..	1990	22	118	1250	25	84	638	20	34
19..	1820	22	108	1140	25	77	670	20	36
20..	1600	22	95	1070	24	69	706	21	40
21..	1440	22	86	1070	23	66	751	21	42
22..	1370	23	85	1140	22	68	760	20	41
23..	1510	24	98	1200	22	71	733	20	40
24..	1840	32	159	1220	21	69	706	19	36
25..	1750	38	180	1140	20	62	679	19	35
26..	1500	36	146	1060	20	57	670	19	34
27..	1430	31	120	1000	19	51	662	20	36
28..	1270	27	92	960	18	47	662	20	36
29..	1230	24	80	930	18	45	662	20	36
30..	1270	21	72	900	17	41	662	20	36
31..	1270	19	65	860	16	37	--	--	--
Total	48970	--	3381	46560	--	4133	20798	--	1149
Total discharge for year (cfs-days).....									1949378
Total load for year (tons).....									564484

A Computed from partly estimated-concentration graph.

## MUSKINGUM RIVER BASIN--Continued

## 3-1465. LICKING RIVER NEAR NEWARK, OHIO

LOCATION.--Temperature recorder at gaging station on right bank at Stadden Bridge, 1 mile downstream from Shawnee Run, 1.5 miles upstream from Equality Run, and 3.5 miles east of Newark, Licking County.

DRAINAGE AREA.--536 square miles.

RECORDS AVAILABLE.--Water temperatures: June 1962 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 82°F July 20, 27, 28; minimum, freezing point on many days during December and January.

EXTREMES, 1962-64.--Water temperatures: Maximum, 82°F July 17-19, 25, 26, Aug. 1, 1963, July 20, 27, 28, 1964; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific total conductivity (microhm-cm at 25°C)	pH	Coliforms per million	Dissolved oxygen
																			Calcium	Non-magnesium				
Sept. 16, 1964				4.5	0.19						316	0	133	145	1.4	0.9		750	338	78	1210	7.6	2.6	28

MUSKINGUM RIVER BASIN—Continued  
 3-1465. LICKING RIVER NEAR NEWARK, OHIO—Continued  
 Temperature (°F) of water, water October 1963 to September 1964  
 (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	62	64	64	62	62	64	64	64	62	62	62	62	62	59	59	60	61	61	60	62	63	63	62	62	62	62	62	63	63	59	54	53	
Maximum	58	60	63	60	58	60	63	59	58	58	60	56	55	55	56	58	58	57	59	60	60	58	60	60	60	60	62	59	54	50	51	58	
Minimum	54	53	48	50	52	54	54	54	52	51	49	48	47	46	46	48	51	52	50	50	54	54	50	54	50	46	47	47	46	43	--	50	
November	53	48	46	47	50	52	54	52	42	42	42	38	39	38	38	34	34	33	32	33	33	34	34	34	34	36	36	42	43	46	44	43	40
Maximum	41	42	42	40	42	42	42	42	38	39	38	38	38	34	34	34	34	34	33	32	33	33	34	34	34	36	36	36	35	34	33	37	34
Minimum	40	40	40	40	41	40	42	38	36	37	38	38	38	32	32	32	33	34	37	37	37	37	38	38	39	34	35	35	34	32	36	33	36
December	33	33	37	37	35	36	36	35	39	37	32	32	32	32	32	32	33	34	37	37	37	37	38	38	39	34	35	35	34	37	38	35	33
Maximum	32	32	33	35	34	35	35	34	35	32	32	32	32	32	32	32	32	33	33	35	33	33	35	35	34	32	32	32	32	32	32	36	33
Minimum	38	38	37	37	39	39	--	--	--	--	38	36	37	38	39	38	39	39	38	38	38	36	36	36	39	39	38	38	40	--	--	38	33
January	37	35	34	34	34	37	38	--	--	--	34	34	36	37	35	36	34	36	36	36	36	35	33	34	34	38	34	36	36	--	--	35	46
February	45	45	47	47	44	42	43	47	46	42	43	44	45	46	47	45	46	47	46	45	44	43	42	43	45	50	46	44	44	43	41	42	43
Maximum	40	43	41	44	42	39	40	42	43	41	41	41	43	44	45	45	46	41	41	42	43	42	43	45	50	46	44	44	43	41	42	43	43
Minimum	46	44	44	44	46	49	53	53	50	49	52	52	53	58	58	56	61	59	58	55	58	60	--	--	--	--	--	--	--	--	--	53	53
March	40	42	42	41	42	46	49	48	45	46	49	51	52	53	52	52	52	52	55	55	55	55	58	--	--	--	--	--	--	--	--	50	50
Maximum	60	63	64	65	65	68	66	68	66	68	66	64	64	63	61	64	65	67	68	71	69	68	72	70	71	70	68	70	66	64	65	62	66
Minimum	55	56	58	58	60	61	64	64	64	62	60	60	61	58	56	58	62	61	64	64	60	62	64	65	65	64	66	61	58	58	58	61	61
April	66	62	65	67	68	70	70	69	75	75	74	72	74	76	74	70	69	69	68	73	74	72	74	77	74	74	75	77	77	78	78	--	72
Maximum	58	58	57	60	60	63	64	64	66	70	66	65	68	70	68	67	66	66	66	70	70	70	70	70	70	67	67	69	69	70	--	66	66
Minimum	74	75	78	76	76	75	72	72	74	77	76	75	71	70	74	76	78	80	82	79	76	78	80	80	82	82	79	78	76	77	76	74	68
May	71	69	70	70	66	66	67	66	68	68	67	64	64	65	68	70	72	72	72	72	72	72	72	72	72	72	72	72	72	70	68	69	69
June	76	78	75	76	76	74	76	74	75	77	77	76	68	69	70	72	72	72	72	72	72	72	72	73	74	73	74	77	77	76	76	74	68
Maximum	68	70	71	72	72	69	68	70	67	66	68	68	63	61	62	62	64	68	65	64	66	69	67	68	68	66	67	72	72	72	68	68	69
Minimum	76	72	73	74	74	72	73	74	74	74	74	68	65	65	65	66	69	69	67	67	71	69	69	63	65	65	61	61	62	--	69	69	
July	68	66	66	68	64	65	67	68	69	68	64	60	62	61	64	67	65	67	65	65	65	67	68	62	58	60	61	58	58	58	58	58	58
August	74	75	78	76	76	75	72	72	74	77	76	75	71	70	74	76	78	80	82	79	76	78	80	80	82	82	79	78	76	77	76	74	68
Maximum	71	69	70	70	66	66	67	66	68	68	67	64	64	65	68	70	72	72	72	72	72	72	72	72	72	72	72	72	72	70	68	69	69
Minimum	76	78	75	76	76	74	76	74	75	77	77	76	68	69	70	72	72	72	72	72	72	72	72	73	74	73	74	77	77	76	76	74	68
September	68	70	71	72	72	69	68	70	67	66	68	68	63	61	62	62	64	68	65	64	66	69	67	68	68	66	67	72	72	72	68	68	69
October	76	72	73	74	74	72	73	74	74	74	74	68	65	65	65	66	69	69	67	67	71	69	69	63	65	65	61	61	62	--	69	69	
Maximum	68	66	66	68	64	65	67	68	69	68	64	60	62	61	64	67	65	67	65	65	65	67	68	62	58	60	61	58	58	58	58	58	58
Minimum	74	75	78	76	76	75	72	72	74	77	76	75	71	70	74	76	78	80	82	79	76	78	80	80	82	82	79	78	76	77	76	74	68



MUSKINGUM RIVER BASIN--Continued  
3-1503. MUSKINGUM RIVER NEAR BEVERLY, OHIO

LOCATION.--At intake line to Ohio River Valley Water Sanitation Commission (OSANCO) monitor at Ohio Power Company water intake near Beverly, Washington County, 1 mile downstream from Waigs Creek, and 1.1 miles upstream from Olive Green Creek.

DRAINAGE AREA.--7,600 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: July 1963 to September 1964.

Water temperatures: July 1963 to September 1964.

EXTREMES.--Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September).

REMARKS.--Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September).

Records of discharge are given for Muskingum River at McConnersville.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl sulfide (CO <sub>2</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific acid conductance (micro-mhos at 25°C)	Detergent (MB AS)	
																			Calcium, magnesium, residue	Non-carbonate			
Oct. 1, 1963.	552					134	24				134	0	190	280		1.6			856	433	323	1480 7.1	--
Oct. 10.....	667					--	--	--	--	--	--	--	--	430			0.08	--	--	--	--	1940 7.0	0.1
Oct. 12.....	632					177	25				160	0	180	480		2.2	--		1230	545	414	2070 7.0	--
Oct. 31.....	1520					--	--	--	--	--	--	--	--	470			.11	--	--	--	--	2060 6.6	.1
Nov. 1.....	1590					163	26				160	0	184	400		4.8	--		1090	514	383	1820 7.0	--
Nov. 13.....	1180					--	--	--	--	--	--	--	--	230		.10	--	--	--	--	--	1260 6.6	.1
Nov. 27.....	859					--	--	--	--	--	160	0	141	260		.11	--	--	636	347	216	1300 7.1	.1
Nov. 30.....	1310					106	20				--	--	--	190		4.5	--	--	--	--	--	1120 7.3	--
Dec. 2.....	1260					110	26				166	0	138	210		4.6	--		724	382	246	1190 6.8	--
Dec. 10.....	908					--	--	--	--	--	--	--	--	360		.10	--	--	--	--	--	1720 7.3	.1
Dec. 20.....	632					--	--	--	--	--	--	--	--	450		.07	--	--	--	--	--	1990 7.0	.2
Dec. 21.....	609					172	24				190	0	176	460		6.7	--		1340	528	372	2060 7.1	--
Jan. 4, 1964.	727					--	--	--	--	--	--	--	--	340			.20	--	--	--	--	1720 7.1	.1
Jan. 11.....	1770					--	--	--	--	--	--	--	--	380			.28	--	--	--	--	1800 7.1	.1
Jan. 13.....	1910					176	24				170	0	179	460		11	--		1330	538	398	2060 7.0	--
Jan. 20.....	1400					--	--	--	--	--	--	--	--	440		.17	--	--	--	--	--	2010 7.3	.1
Jan. 27.....	5220					--	--	--	--	--	--	--	--	312		.13	--	--	--	--	--	1520 7.1	.2
Jan. 30.....	2570					94	20				84	0	158	180		7.8	--		636	317	248	1050 6.4	--
Feb. 5.....	1470					75	21				86	0	157	108		8.4	--		536	274	203	813 6.7	--
Feb. 7.....	1990					--	--	--	--	--	--	--	--	132			.10	--	--	--	--	878 6.8	.1
Feb. 15.....	1430					--	--	--	--	--	--	--	--	195		.22	--	--	--	--	--	1150 7.1	.1
Feb. 22.....	1280					--	--	--	--	--	--	--	--	210		.07	--	--	--	--	--	1220 7.0	.1
Feb. 24.....	1280					120	25				117	0	183	240		7.9	--		868	403	307	1310 6.5	--

MUSKINGUM RIVER BASIN--Continued  
 3-1503. MUSKINGUM RIVER NEAR BEVERLY, OHIO--Continued  
 Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (mg/l)	Aluminum (Al) (mg/l)	Iron (Fe) (mg/l)	Manganese (Mn) (mg/l)	Calcium (Ca) (mg/l)	Magnesium (Mg) (mg/l)	Sodium (Na) (mg/l)	Potassium (K) (mg/l)	Lithium (Li) (mg/l)	Bicarbonate (HCO <sub>3</sub> ) (mg/l)	Sulfate (SO <sub>4</sub> ) (mg/l)	Chloride (Cl) (mg/l)	Fluoride (F) (mg/l)	Nitrate (NO <sub>3</sub> ) (mg/l)	Phosphate (PO <sub>4</sub> ) (mg/l)	Dissolved solids (residue at 180°C) (mg/l)	Hardness as CaCO <sub>3</sub> (mg/l)	To-Specific conductance (micro-mhos at 25°C)	Detergent (MB AS)	pH
Mar. 4, 1964.	7320					120	25				131	0	165	256	7.0		810	403	295	1340	6.4
Mar. 9.....	31000													110		0.01				618	0.1
Mar. 12.....	33100					27	7.9				17	0	77	16	6.6		163	100	86	285	6.0
Mar. 18.....	34800													136		0.00				684	6.4
Mar. 26.....	32800													42		0.04				401	6.8
Apr. 2.....	23500													36		0.03				448	7.4
Apr. 11.....	21800													92		0.05				543	7.1
Apr. 16.....	16800													92		0.05				703	8.1
Apr. 22.....	14800													90		0.06				678	8.2
Apr. 22.....	28400					41	10				48	0	84	45	4.0		266	143	104	411	7.0
Apr. 28.....	29400					75	11				62	0	74	153	4.3		519	232	181	744	7.7
May 2.....	22900													76		0.02				569	8.1
May 5.....	15200					54	14				85	0	93	48	3.1		318	192	123	494	8.2
May 8.....	12500													60		0.10				549	8.1
May 15.....	9860													82		0.05				907	8.5
May 21.....	4510					84	16				110	0	100	132	3.5		501	276	186	807	8.5
May 27.....	4830													92		0.03				732	8.3
June 5.....	2840													123		0.14				880	7.4
June 10.....	5510					93	27				120	4	168	121	2.3		560	343	238	907	8.3
June 15.....	5450													128		0.14				885	8.3
June 24.....	6180													87		0.17				697	8.0
June 29.....	3010					64	19				104	0	120	50	2.5		348	238	153	577	8.2
July 1.....	2520					69	17				114	0	108	52	0.9		388	242	149	621	8.2
July 8.....	1610													140		0.17				628	7.4
July 11.....	1680													140		0.14				958	7.4
July 18.....	2870													200		0.14				1130	8.0
July 22.....	1720					119	28				100	0	179	240	2.3		790	412	330	1290	7.2
July 31.....	1470													190		0.20				1110	8.1
Aug. 5.....	3600					140	23				118	0	164	328	5.1		980	444	348	1520	7.8
Aug. 11.....	1400					94	17				112	0	145	168	2.9		596	305	213	973	7.5
Aug. 15.....	2130													252		0.17				1330	7.8
Aug. 26.....	1480													272		0.24				1260	7.2
Aug. 28.....	1350													260		0.20				1280	7.2

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Temperature (°F) of water, water year October 1963 to September 1964

[illegible]



## HOCKING RIVER BASIN

3-1955. HOCKING RIVER AT ATHENS, OHIO

LOCATION.--At gaging station on left bank at Mill Street Bridge at Athens, Athens County, 3.5 miles downstream from Margaret Creek.

DRAINAGE AREA (revised).--943 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1964.

Water temperatures: October 1954 to September 1964.

Sediment records: October 1956 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 1,480 micromhos Nov. 13; minimum daily, 255 micromhos Apr. 21.

Sediment concentrations: Maximum daily, 79.9 ppm Mar. 5; minimum daily, 3 ppm on several days in October, June, and July.

Sediment loads: Maximum daily, 671 ppm Mar. 5; minimum daily, 11; minimum daily, less than 0.5 ton on several days in October.

EXTREMES, 1954-64.--Specific conductance: Maximum daily, 2,080 micromhos Aug. 11, 1962; 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 (1956-64): Maximum daily, 1,320 ppm July 8, 1958; minimum daily, 1 ppm on many days most years.

Sediment loads (1956-64): Maximum daily, 44,000 tons Mar. 5, 1963; minimum daily, less than 0.5 ton on many days most years.

REMARKS.--Samples for iron and manganese were filtered clear when collected. Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance on or near low flow, and (3) composite daily samples for each month. Some regulation of flow by Tom Jenkins Reservoir and mill above station. Flow affected by ice Dec. 26-29, Jan. 8-16, 26-30, Feb. 3-5, 11, 12, 15.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbocation (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved residue (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific conductance (micro-mhos at 25°C)	pH or Col.	Oxygen consumed		
																			Calcium, magnesium	Non-bicarbonate			Unfiltered	Fil-tered	
Oct. 2, 1963.	43										96	404	110	0.3	3.1			904	464	385		1260	6.8		
Oct. 18.....	35			0.14	0.32						108	420	152	.2	2.7			978	490	401		1420	7.0	1	1
Oct. 25.....	49										102	410	130	.1	2.3			922	472	388		1360	6.7		
Oct. 1-31....	42.7																								
Nov. 13.....	94										33	600	110	.2	5.0			1110	608	581		1480	6.6		
Nov. 25.....	126										58	303	54	.2	3.9			999	328	280		882	6.5		
Nov. 29.....	50			.19	2.4													862	466	420		1250	6.5	1	1
Nov. 1-30....	80.2										56	448	95	.2	3.1										
Dec. 9.....	80										40	397	95	.3	7.6			786	414	381		1140	6.6		
Dec. 19.....	46			.60	1.5																	1	1		
Dec. 29.....	60										80	480	128	.4	10			1000	528	462		1410	6.6		
Dec. 1-31....	65.3										49	454	105	.4	7.4			910	480	440		1280	6.5		
Jan. 7, 1964.	158										2	520	185	.2	10			1100	509	508	0.2	1600	4.8		
Jan. 22.....	432			.12	4.7												.11						1	4	
Jan. 28.....	340										30	292	83	.2	3.8			475	284	253		752	6.2		
Jan. 1-31....	221										40	322	132	.2	5.6			770	394	361		1130	6.3		
Feb. 11.....	210										32	232	100	.3	4.0			583	324	298		879	6.5		
Feb. 24.....	176			2.8	1.7												.05						1	1	
Feb. 27.....	176										68		150	.3	4.4			696	373	317		1080	6.8		
Feb. 1-29....	213										46	260	128	.3	4.2			681	354	316		1000	6.3		

178	44	265	174	1	3.6	--	730	400	364	1130	6.1	--
Mar. 1, 1964	22	78	29	2	5.0	--	206	115	97	309	6.2	--
Mar. 6	--	--	--	--	--	.04	--	--	--	--	--	0
Mar. 25	1.6	.65	--	--	--	--	--	--	--	--	--	2
Mar. 1-10	--	--	--	--	--	--	--	--	--	--	--	--
14-31	36	177	57	2	4.0	--	397	242	213	634	6.1	--
Apr. 2	--	224	66	0	3.2	--	466	294	246	717	7.0	--
Apr. 21	58	73	13	1	2.5	--	164	101	76	255	6.4	--
Apr. 23	34	.22	--	--	--	.06	--	--	--	--	--	1
Apr. 1-30	36	154	33	2	3.4	--	308	202	173	491	6.2	--
May 2	--	158	39	3	2.5	--	329	214	182	528	7.3	--
May 31	44	380	70	3	2.5	--	730	422	386	1010	7.4	--
May 1-31	45	289	58	3	2.1	--	571	340	303	827	7.3	--
June 3	12	--	--	--	--	.02	--	--	--	--	--	1
June 10	10	432	72	3	2.2	--	760	440	432	1070	6.8	--
June 18	382	225	41	3	6.3	--	434	260	239	656	6.6	--
June 1-30	41	332	66	3	3.0	--	568	381	347	932	7.1	--
July 2	80	309	60	3	2.7	--	600	478	412	913	8.0	--
July 7	117	--	--	--	--	.05	--	--	--	--	--	1
July 7	115	488	105	4	1.8	--	882	520	510	1220	7.3	--
July 22	101	60	88	4	2.0	--	736	436	367	1090	7.5	--
July 1-31	109	--	--	--	--	--	--	--	--	--	--	--
Aug. 7	54	399	148	3	4	--	904	526	462	1310	7.4	--
Aug. 19	50	393	101	3	4	--	802	422	392	1120	6.7	--
Aug. 21	50	--	--	--	--	.07	--	--	--	--	--	1
Aug. 1-31	55.0	406	110	3	3	--	854	465	417	1210	7.5	--
Sept. 1	--	434	123	3	1.1	--	940	472	423	1280	7.0	--
Sept. 16	72	149	41	4	1.2	.09	357	198	139	598	7.8	1
Sept. 17	111	141	40	3	1.2	--	337	200	141	538	7.6	2
Sept. 1-30	62	316	94	3	1.5	--	706	372	321	1040	7.4	--

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

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics			Ammonia nitrogen as NH <sub>4</sub>	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as C <sub>6</sub> H <sub>5</sub> OH	Alkyl benzene sulfonate (ABS)				
Oct. 18, 1963.....	8.7	84			0.2		3	M-2
Nov. 29.....	9.2	75					--	0
Dec. 29.....	5.0	34			.2		4	0
Jan. 22, 1964.....	9.3	64			.2		20	Ch-8
Feb. 24.....	8.4	58			.1		45	M-4
Mar. 25.....	8.3	73			.0		40	0
Apr. 23.....	6.6	65			.0		35	Ch-2
June 3.....	9.0	94			.1		2	0
July 7.....	9.1	106			.0		5	0
Aug. 21.....	8.0	94			.1		2	0
Sept. 6.....	9.6	102			.1		1	V-1

Month	Temperature (°F) of water, water year October 1963 to September 1964 (Once-daily measurement at 0700)																															Average
	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	
October.....	55	57	60	58	58	58	59	58	57	55	58	58	55	55	55	55	55	54	57	55	57	56	57	57	58	57	55	57	52	53		
November.....	52	52	48	42	45	48	48	58	48	47	45	43	42	41	42	42	46	47	45	49	52	47	45	45	45	44	45	42	--	46		
December.....	41	39	--	39	37	37	46	39	37	35	35	35	37	34	33	34	32	32	32	32	32	32	32	32	32	32	32	32	32	35		
January.....	33	37	33	37	33	33	33	34	34	32	32	33	34	32	32	32	32	32	32	32	32	33	33	33	32	33	32	32	32	33		
February.....	33	32	32	32	32	34	33	32	32	33	32	32	33	32	33	32	32	32	33	33	32	33	32	33	33	33	33	33	--	33		
March.....	33	36	39	39	42	40	41	43	45	45	--	--	--	43	43	44	45	45	44	45	43	43	43	45	47	49	46	44	45	43		
April.....	37	40	39	34	40	47	49	50	45	46	41	49	49	52	54	53	52	52	54	56	59	59	58	56	58	58	59	59	--	50		
May.....	56	57	59	61	62	63	65	67	67	66	65	65	64	63	60	60	62	63	65	67	66	67	67	67	68	68	67	64	64	63		
June.....	63	59	59	62	63	64	66	67	69	72	72	74	74	74	75	75	70	70	72	74	75	77	77	77	74	74	75	76	--	71		
July.....	77	76	76	76	74	74	74	74	73	73	74	71	71	71	71	71	72	73	76	77	78	78	79	79	79	79	79	78	76	75		
August.....	74	75	77	78	77	75	77	73	74	74	70	70	70	67	68	69	70	69	67	65	62	62	62	62	62	62	62	62	62	62		
September.....	73	71	71	71	72	68	68	69	69	70	71	70	70	64	64	63	63	65	65	66	66	66	68	70	66	68	67	65	63	--		

## HOCKING RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964

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..	46	8	1	62	9	2	116	5	2
2..	43	7	1	64	10	2	114	6	2
3..	40	6	1	65	10	2	96	6	2
4..	39	5	1	65	10	2	82	6	1
5..	40	5	1	64	10	2	74	6	1
6..	39	5	1	65	10	2	69	6	1
7..	38	5	1	67	10	2	67	7	1
8..	36	5	T	71	11	2	71	7	1
9..	33	5	T	86	10	2	80	7	2
10..	30	5	T	76	10	2	82	7	2
11..	33	5	T	74	9	2	82	7	2
12..	35	5	T	74	8	2	84	8	2
13..	29	5	T	94	7	2	84	8	2
14..	36	4	T	106	5	1	78	8	2
15..	34	4	T	114	5	2	60	8	1
16..	37	4	T	114	4	1	55	8	1
17..	31	3	T	112	4	1	50	9	1
18..	35	3	T	100	4	1	48	10	1
19..	40	3	T	94	4	1	46	9	1
20..	46	3	T	102	4	1	44	9	1
21..	44	3	T	114	5	2	42	9	1
22..	42	3	T	104	5	1	42	9	1
23..	44	3	T	59	5	1	42	10	1
24..	45	3	T	74	5	1	42	10	1
25..	49	4	1	126	5	2	44	10	1
26..	50	4	1	67	5	1	48	10	1
27..	54	5	1	48	5	1	52	13	2
28..	64	6	1	44	5	1	59	13	2
29..	69	7	1	50	5	1	60	14	2
30..	64	7	1	52	5	1	60	14	2
31..	60	8	1	--	--	--	50	14	2
Total	1325	--	20	2407	--	46	2023	--	45
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..	53	15	2	187	5	2	178	8	4
2..	50	17	2	178	6	3	254	20	14
3..	58	17	3	160	7	3	436	48	60
4..	73	18	4	150	8	3	2220	616	5850
5..	92	19	5	140	9	3	7740	671	14000
6..	130	19	7	178	11	5	8830	256	6100
7..	158	20	8	376	21	21	4960	201	2690
8..	150	24	10	400	22	24	2830	182	1390
9..	170	29	13	312	20	17	7260	475	11000
10..	200	34	18	260	16	11	20100	390	21200
11..	260	34	24	210	14	8	31200	418	35200
12..	190	32	16	180	11	5	21900	--	23000
13..	130	32	11	176	9	4	10800	--	8500
14..	110	29	9	176	8	4	4940	210	2800
15..	100	25	7	180	8	4	5790	189	2950
16..	90	19	5	192	8	4	5130	144	1990
17..	90	13	3	219	7	4	3550	122	1170
18..	88	7	2	231	7	4	2740	106	784
19..	86	7	2	250	7	5	2340	89	562
20..	134	8	3	241	8	5	1690	79	360
21..	284	10	8	302	9	7	1340	67	242
22..	432	11	13	254	8	5	1520	68	279
23..	464	15	19	184	8	4	1350	67	244
24..	448	22	27	176	7	3	1150	66	205
25..	543	20	29	165	7	3	1050	53	150
26..	650	17	30	170	6	3	1120	60	181
27..	500	14	19	176	6	3	1250	66	223
28..	340	11	10	184	6	3	1080	60	175
29..	300	9	7	173	6	3	958	50	129
30..	260	7	5	--	--	--	888	43	103
31..	216	5	3	--	--	--	836	27	61
Total	6849	--	324	6180	--	173	157430	--	141616

E Estimated.

S Computed by subdividing day.

T Less than 0.5 ton.

## HOCKING RIVER BASIN--Continued

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

## Suspended sediment, water year October 1963 to September 1964--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..	797	20	43	2030	78	428	197	6	3
2..	976	--	140	1710	70	323	200	6	3
3..	4080	376	4690	1400	59	223	188	5	2
4..	6880	285	5290	1190	53	170	176	5	2
5..	5660	145	2220	1050	42	119	170	4	2
6..	3160	118	1010	927	38	95	165	4	2
7..	3350	206	2300	823	32	71	170	5	2
8..	8390	299	6770	726	27	53	243	5	3
9..	4870	124	1630	668	23	41	283	5	4
10..	2750	101	750	596	20	32	295	5	4
11..	1920	80	415	527	17	24	224	5	3
12..	1590	55	236	495	15	20	173	5	2
13..	1440	53	206	495	12	16	158	5	2
14..	1410	51	194	495	11	15	168	5	2
15..	1200	46	149	485	10	13	353	--	E 25
16..	1010	43	117	430	10	12	964	43	112
17..	888	40	96	387	10	10	650	13	23
18..	988	42	112	346	10	9	382	10	10
19..	3670	308	3230	320	10	9	287	9	7
20..	8780	293	6940	303	10	8	267	8	6
21..	12000	158	5120	275	10	7	247	8	5
22..	10800	111	3240	255	10	7	251	8	5
23..	7680	104	2160	243	10	6	392	8	8
24..	3500	137	1290	267	10	7	356	6	6
25..	2890	122	952	315	10	8	263	5	4
26..	2340	90	569	287	10	8	204	3	2
27..	1990	86	462	243	9	6	168	3	1
28..	2530	112	765	224	9	5	148	4	2
29..	2380	98	630	207	8	4	136	4	1
30..	2300	83	515	194	7	4	125	4	1
31..	--	--	--	188	7	4	--	--	--
Total	112219	--	52241	18101	--	1757	8003	--	252
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..	121	4	1	80	10	2	49	10	1
2..	117	4	1	72	10	2	42	10	1
3..	113	3	1	59	10	2	42	10	1
4..	123	4	1	29	10	1	42	10	1
5..	115	5	2	24	10	1	41	10	1
6..	130	5	2	42	10	1	37	10	1
7..	115	6	2	54	10	1	36	10	1
8..	103	7	2	54	10	1	35	10	1
9..	101	9	2	52	9	1	41	10	1
10..	99	8	2	52	9	1	99	10	3
11..	94	9	2	53	10	1	109	9	3
12..	101	10	3	56	10	2	109	10	3
13..	109	10	3	69	10	2	111	12	4
14..	121	10	3	72	9	2	111	11	3
15..	123	10	3	66	9	2	111	10	3
16..	105	10	3	59	10	2	109	9	3
17..	130	10	4	54	10	1	111	9	3
18..	207	9	5	53	10	1	113	9	3
19..	170	8	4	50	10	1	121	8	2
20..	141	7	3	49	11	1	72	7	1
21..	115	7	2	50	11	1	68	7	1
22..	101	7	2	52	11	2	63	7	1
23..	92	7	2	56	10	2	56	8	1
24..	85	7	2	66	10	2	53	7	1
25..	82	7	2	63	10	2	48	7	1
26..	77	7	1	63	10	2	46	8	1
27..	74	7	1	54	10	1	44	8	1
28..	83	7	2	48	10	1	54	9	1
29..	82	8	2	52	10	1	63	9	2
30..	79	9	2	53	10	1	57	9	1
31..	85	10	2	49	10	1	--	--	--
Total	3393	--	69	1705	--	44	2093	--	51

Total discharge for year (cfs-days)..... 321728  
 Total load for year (tons)..... 196638

E Estimated.

S Computed by subdividing day.

## HOCKING RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1963 to September 1964.  
 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, sediment; N, in native water;  
 P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (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	
Mar. 4, 1964.....	1500			2480	2200		41	50	65	80	93	96	99	100	--		SBWC
Apr. 8.....	1355			8770	305		55	67	78	86	92	93	96	97	100		SBWC
Apr. 8.....	1355			8770	305		25	40	61	85	90	90	94	97	100		SEN



## KANAWHA RIVER BASIN--Continued

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 1964.  
 Jan. 16--18.  
 EXTREMES, 1963-64.--Water temperatures: Maximum, 82°F on several days in June and July; minimum, freezing point Dec. 29, 30, and Jan. 16-18.  
 EXTREMES, 1953-64.--Water temperatures: Maximum, 85°F Aug. 26, 1959; minimum, freezing point on several days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964

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



## KANAWHA RIVER BASIN--Continued

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

LOCATION.--At city water plant, at Marlinton, Pocahontas County, 1 mile upstream from mouth, and 2 miles downstream from discontinued gaging station.  
 DRAINAGE AREA.--108 square miles (at discontinued gaging station).  
 RECORDS AVAILABLE.--Water temperatures: October 1946 to September 1964.  
 EXTREMES, 1963-64.--Water temperatures: Maximum, 77°F June 23, 24, 28; minimum, freezing point on many days during winter months.  
 EXTREMES, 1946-64.--Water temperatures: Maximum, 82°F July 24, 1952 and June 2, 1959; minimum, freezing point on many days during winter months.

Month	Temperature (°F) of water, water year October 1963 to September 1964																															Aver- age
	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	
October.....	57	57	58	58	57	56	57	56	56	54	54	55	50	50	49	49	48	50	50	50	49	49	50	50	51	51	52	55	41	45	44	52
November.....	45	44	43	40	42	42	44	44	44	43	39	36	35	36	36	35	37	35	36	34	37	36	37	36	37	48	39	37	38	40	39	40
December.....	35	32	35	35	36	35	32	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.....	32	32	32	32	32	32	32	32	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.....	34	34	32	32	34	36	33	32	34	33	32	34	34	32	33	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	33
March.....	32	33	34	36	38	41	41	40	41	43	40	41	40	40	40	38	40	38	35	35	34	35	36	36	38	42	38	36	36	33	35	38
April.....	34	34	42	42	40	42	42	44	42	41	42	46	48	49	50	48	50	54	50	52	52	55	54	52	52	52	52	52	53	57	--	48
May.....	56	56	54	52	56	56	57	57	60	61	61	59	55	59	60	58	62	63	62	62	62	62	62	62	62	65	65	63	63	60	61	60
June.....	60	60	58	56	59	61	65	65	67	70	71	70	72	72	70	69	65	65	67	69	75	75	77	77	75	77	75	77	76	76	--	69
July.....	76	76	76	76	68	69	70	72	69	69	67	68	66	65	63	65	67	70	73	72	73	73	72	74	73	74	73	72	73	72	70	71
August.....	70	72	73	72	69	70	70	73	70	70	72	72	69	67	66	63	62	66	66	67	65	72	73	72	73	73	72	72	72	72	70	72
September.....	69	67	68	72	72	72	72	66	68	68	69	70	66	66	64	64	64	65	66	63	62	62	63	67	65	62	63	64	62	62	--	66



## KANAWHA RIVER BASIN--Continued

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

LOCATION.--At the Appalachian Electric Power Company, Cabin Creek steam electric cooling water intake, at Cabin Creek, Kanawha County.

DRAINAGE AREA.--8,661 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1950 to September 1964.

EXTREMES, 1950-64.--Water temperatures: Maximum, 92°F on several days in August 1955 and 1959; minimum, freezing point Feb. 10, 1951, Feb. 14-16, 1958, and Jan. 16, 1964.

REMARKS.--Water temperature records furnished by the Appalachian Electric Power Company.

Temperature (°F) of water, water year October 1963 to September 1964

Month		Day																												Ave- 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				
October.....	75	74	73	73	--	--	72	71	71	72	71	71	--	71	70	70	70	53	54	55	54	70	71	71	71	--	--	69	66	65	65			
November.....	63	62	--	60	60	59	59	--	--	52	52	51	52	53	--	53	53	54	55	54	--	--	--	--	--	52	54	--	51	45	--			
December.....	--	43	42	41	41	42	--	--	42	42	40	40	--	--	37	37	36	35	35	--	--	35	--	--	--	36	37	36	--	35	36	--		
January.....	--	35	36	--	--	36	35	34	36	38	36	35	35	33	33	32	34	35	--	35	35	35	37	38	40	--	40	39	38	37	38	36		
February.....	--	--	38	38	38	38	--	--	38	37	37	37	37	--	--	37	37	37	37	37	--	--	37	37	37	37	37	36	--	--	--	--		
March.....	--	39	41	42	45	45	--	--	--	46	47	45	45	--	--	47	47	47	45	45	--	--	45	46	47	48	48	--	--	48	48	--	--	
April.....	47	46	48	--	--	49	52	52	52	51	--	--	54	55	56	57	--	--	60	61	62	63	63	--	--	63	--	--	63	--	--	--	--	
May.....	63	--	--	65	66	--	--	70	--	--	72	72	73	71	71	--	71	72	73	75	77	--	--	--	--	--	79	78	79	79	--	--	--	--
June.....	74	--	--	--	--	74	75	--	--	77	76	78	79	--	--	82	82	83	80	--	86	85	85	85	85	85	--	82	86	--	--	--	--	
July.....	85	86	--	--	--	86	86	86	86	86	--	83	82	85	86	85	--	--	86	84	83	85	85	--	--	--	--	86	88	88	87	--	--	
August.....	86	86	84	79	79	79	--	--	82	83	83	82	81	--	--	80	79	79	80	81	82	--	82	83	83	83	84	--	83	84	--	--	--	--
September.....	84	80	79	80	--	--	82	83	83	83	--	--	78	78	78	78	77	--	--	77	78	78	77	77	--	--	74	74	69	--	--	--	--	

KANAWHA RIVER BASIN--Continued

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

LOCATION.--Temperature recorder at gaging station near left bank on downstream side of pier of 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 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 69°F on several days in October and September; minimum, 33°F on many days during winter months.

EXTREMES, 1960-64.--Water temperatures: Maximum, 85°F Aug. 30 and Sept. 1, 1960; minimum, freezing point Feb. 25, 26, 1963.

Temperature (°F) of water, water year October 1963 to September 1964  
(Continuous ethyl alcohol-actuated thermometer)

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



## KANAWHA RIVER BASIN--Continued

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

LOCATION.--Temperature recorder at gaging station on right bank at downstream side of pier of 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, 1964.  
 EXTREMES.--Water temperatures: Maximum, 87°F July 23, 1964; minimum, 34°F on several days in January and February.  
 EXTREMES, 1960-61.--Water temperatures: Maximum, 87°F July 23, 1961; freezing point on several days in February 1961.

Temperature (°F) of water, water year October 1963 to September 1964  
 (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	66	66	66	65	65	64	64	63	62	63	62	60	60	59	59	59	59	59	59	59	60	60	62	61	61	61	62	62	59	56	62	
Minimum .....	62	62	65	64	63	63	63	62	61	60	61	60	58	58	58	58	58	58	58	58	58	58	58	60	60	60	60	61	59	56	60	60	
November																																	
Maximum .....	55	55	53	52	51	52	53	54	55	55	53	50	49	48	47	47	47	49	50	50	50	51	51	51	50	48	48	48	48	48	51	51	
Minimum .....	55	53	52	51	51	52	53	54	53	50	49	48	47	47	47	47	47	49	50	50	50	50	51	50	48	47	47	48	48	46	50	50	
December																																	
Maximum .....	46	45	44	43	42	42	42	42	42	41	40	40	40	39	38	37	36	36	36	36	36	36	36	36	36	35	35	35	35	35	37	39	
Minimum .....	45	44	43	42	42	42	42	41	40	40	40	40	39	38	37	36	36	36	36	36	36	36	36	36	35	35	35	35	35	35	38	38	
January																																	
Maximum .....	37	37	37	36	36	36	36	38	39	39	39	37	35	35	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	38	38	38	
Minimum .....	37	37	37	36	36	36	36	36	36	38	39	37	35	35	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	38	38	38	
February																																	
Maximum .....	38	38	38	36	36	37	37	36	36	36	35	34	35	35	36	36	36	36	36	37	37	37	37	37	36	36	37	38	38	38	38	37	
Minimum .....	38	38	38	36	36	36	36	36	36	36	35	34	34	35	35	36	37	37	37	37	37	37	37	37	36	36	37	36	36	37	36	36	
March																																	
Maximum .....	38	40	40	42	44	44	44	43	45	45	45	45	46	46	45	45	44	44	43	43	43	43	43	43	43	44	46	46	46	46	44	44	
Minimum .....	38	38	40	40	42	44	43	43	45	45	44	43	43	45	44	45	44	43	43	43	43	43	43	43	43	44	46	46	46	46	42	43	
April																																	
Maximum .....	46	--	46	46	46	47	50	50	49	48	48	49	--	--	--	--	--	--	--	--	--	--	54	53	52	54	56	56	54	58	--	--	
Minimum .....	42	--	46	45	45	46	47	49	48	46	48	48	--	--	--	--	--	--	--	--	--	52	52	52	53	54	54	54	--	--	--	--	
May																																	
Maximum .....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	75	76	78	78	76	76	74	72	72	72	72	
Minimum .....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	70	70	71	72	74	73	72	72	68	66	68	
June																																	
Maximum .....	68	71	70	72	73	71	68	71	76	76	76	75	75	76	78	77	76	76	76	76	76	82	84	84	83	81	79	80	82	80	81	84	
Minimum .....	66	65	66	65	66	68	66	66	69	72	72	70	73	73	74	72	69	68	68	68	68	71	74	77	78	78	74	75	73	73	73	71	
July																																	
Maximum .....	83	81	82	80	80	79	78	76	76	80	78	75	77	79	83	84	84	83	85	85	85	87	87	87	85	84	86	85	84	81	82	81	
Minimum .....	79	77	78	78	74	73	74	74	74	72	73	75	72	73	74	75	78	78	80	80	80	80	80	80	80	80	80	79	79	81	79	76	
August																																	
Maximum .....	81	81	78	75	78	76	74	74	77	76	79	74	72	71	70	72	71	68	72	74	76	75	76	78	76	77	77	79	78	80	76	76	
Minimum .....	76	76	72	70	74	70	71	70	71	73	74	70	68	68	68	67	68	64	64	67	69	72	71	71	72	70	72	74	74	76	71	71	
September																																	
Maximum .....	78	76	80	78	78	78	79	79	80	80	79	77	70	68	67	66	65	64	65	67	68	68	68	65	63	63	63	63	62	62	62	61	
Minimum .....	74	72	72	72	73	72	73	74	72	72	73	70	68	66	64	64	64	64	64	64	64	65	67	65	62	60	62	62	62	62	62	61	







## KANAWHA RIVER BASIN--Continued

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

LOCATION.--At intake line to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at Kanawha Valley Power Company Intake at Winfield Dam, Putnam County, 1 mile downstream from Winfield Toll bridge.

DRAINAGE AREA.--11,809 square miles.

RECORDS AVAILABLE.--Chemical analyses:

Water temperatures: October 1956 to September 1964.

EXTREMES, 1963-64.--Dissolved solids: Maximum, 244 ppm July 20; minimum, 50 ppm Mar. 8.

Hardness: Maximum, 241 ppm Sept. 3; minimum, 84 microhms Mar. 8.

Surface conductance: Maximum daily, 889 microhms Sept. 3; minimum daily, 84 microhms Mar. 8.

Water temperatures: Maximum, 91°F July 24; minimum, 36°F Jan. 17.

EXTREMES, 1956-64.--Dissolved solids (1956-62, 1963-64): Maximum, 1,460 ppm Apr. 21, 1961; minimum, 50 ppm Mar. 8, 1964.

Hardness (1956-62, 1963-64): Maximum, 241 ppm Sept. 3, 1964; minimum, 24 ppm Apr. 21, 1961.

Specific conductance: Maximum daily, 2,700 microhms Apr. 21, 1961; minimum daily, 77 microhms Jan. 31, 1957.

Water temperatures: Maximum, 91°F July 24, 1964; minimum, freezing point Feb. 14, 1958, Mar. 12, 1960.

REMARKS.--Records of specific conductance of daily samples available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum and minimum daily specific conductance for each month; (2) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September). No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica num (Al)	Alu min (Al)	Iron (Fe)	Man-ga-nese (Mn)	Cal-cium (Ca)	Mag-ne-sium (Mg)	Sodium (Na)	Potas-sium (K)	Lith-ium (Li)	Bi-car-bon-ate (HCO <sub>3</sub> )	Car-bon-ate (SO <sub>4</sub> )	Chloride (Cl)	Fluo-ride (F)	Ni-trate (NO <sub>3</sub> )	Phos-phate as PO <sub>4</sub>	Dis-solved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-tal conduct-ance (micro-mhos at 25°C)	De-ter-gent (MB AS)	
																		Cal-cium, mag-nesium	Non-car-bon-ate			
Oct. 8, 1963.												73				0.41				736	7.3	0.2
Oct. 11.....												68				.50				733	7.3	.2
Oct. 15.....						44	9.2				81	0	93		0.2		313	148	82	602	6.5	--
Oct. 24.....						56	9.8				80	0	144			.2	442	180	115	783	6.8	--
Nov. 1.....						50	9.3				92	0	115		.2		386	163	88	691	6.9	--
Nov. 14.....						21	7.0				46	0	25		3.2		127	82	44	244	6.7	--
Nov. 19.....												49				.13				308	6.0	.1
Nov. 28.....												63				.21				581	6.3	.1
Dec. 2.....						13	2.5				22	0	14		2.9		83	43	25	141	6.2	.1
Dec. 10.....												40				.16				259	6.9	.1
Dec. 15.....												36				.12				279	6.6	.1
Dec. 31.....						30	6.2				50	0	58			.22	224	101	60	422	7.2	--
an. 4, 1964.						33	5.4				60	0	60		.2		237	105	56	442	6.6	--
an. 6.....												55				.46				434	7.3	.1
an. 13.....						11	2.9				24	0	18		3.6		69	40	20	114	6.5	--
an. 14.....												19	9.0			.15				126	7.0	.0
an. 20.....												37				.30				255	6.9	.1
an. 28.....												17				.30				124	6.7	.0
b. 7.....						19	5.3				13	0	36		14		161	70	59	242	7.0	--
b. 15.....												32				.18				204	6.1	.1
b. 16.....												31				.13				174	6.6	.0
b. 18.....						10	4.9				24	0	28		3.3		88	45	26	142	7.2	--
b. 29.....												40				.17				236	6.3	.1

Date	19	5.4	27	0	40	13	30	70	48	244	6.6	--
Mar. 2, 1964.	19	5.4	27	0	15	3.3	30	70	48	244	6.6	--
Mar. 8	8.1	2.0	18	0	5.5	3.3	30	28	13	84	6.4	--
Mar. 14	--	--	--	25	--	--	--	--	--	128	7.6	0
Mar. 21	--	--	--	25	--	--	--	--	--	161	6.6	0
Mar. 28	--	--	--	34	--	--	--	--	--	192	7.4	0
Apr. 2	19	4.5	32	0	26	6.9	115	66	40	218	6.6	--
Apr. 9	--	--	--	28	--	--	--	--	--	166	6.5	--
Apr. 15	--	--	--	28	--	--	--	--	--	170	6.5	0
Apr. 19	--	--	--	25	--	--	--	--	--	168	6.6	0
Apr. 21	10	2.9	15	0	8.4	3.7	78	37	25	117	6.8	--
May 1	--	--	--	34	--	--	--	--	--	242	6.7	1
May 4	20	5.4	34	0	22	4.8	120	72	44	219	6.9	--
May 16	--	--	--	47	--	--	--	--	--	318	6.7	0
May 20	--	--	--	46	--	--	--	--	--	384	6.7	1
May 21	--	--	--	64	--	--	--	--	--	455	7.8	1
May 30	--	--	--	64	--	--	--	--	--	517	6.7	--
May 31	46	6.3	55	0	80	1.3	305	141	96	517	6.7	--
June 1	--	--	--	64	--	--	--	--	--	536	6.3	1
June 7	--	--	--	60	--	--	--	--	--	494	6.5	2
June 14	--	--	--	54	--	--	--	--	--	458	7.8	1
June 18	34	9.2	57	0	56	6.2	235	123	76	413	7.7	--
June 23	47	8.6	47	0	90	5.9	306	153	114	537	7.5	--
July 4	--	--	--	56	--	--	--	--	--	625	6.9	2
July 11	--	--	--	64	--	--	--	--	--	649	6.8	2
July 15	--	--	--	55	--	--	--	--	--	833	6.8	2
July 20	71	9.3	82	0	170	0	544	215	148	850	6.9	--
July 27	29	8.0	57	0	40	20	238	106	59	483	7.2	1
July 31	--	--	--	56	--	--	--	--	--	611	6.9	1
Aug. 6	--	--	--	44	--	--	--	--	--	430	6.8	--
Aug. 11	26	6.1	54	0	38	5.9	191	90	46	310	6.8	--
Aug. 15	--	--	--	59	--	--	--	--	--	439	6.5	1
Aug. 21	62	4.4	50	0	140	1.0	413	173	132	680	6.8	--
Aug. 29	--	--	--	62	--	--	--	--	--	614	6.7	2



## OHIO RIVER MAIN STEM

3-2022. OHIO RIVER NEAR HUNTINGTON, W. VA.

LOCATION --At intake line to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at the Huntington filtration plant at 40th Street and River Road, Cabell County, 0.5 mile upstream from Guyandotte River, and 6.7 miles upstream from gaging station.

DRAINAGE AREA --54,200 square miles, approximately.

RECORDS AVAILABLE --Chemical analyses: July 1963 to September 1964.

Water temperatures: July to September 1963, unpublished; October 1963 to September 1964.

EXTREMES, 1963-64 --Dissolved solids: Maximum, 603 ppm Nov. 17; minimum, 119 ppm Mar. 10.

Hardness: Maximum, 263 ppm Nov. 17; minimum, 68 ppm Mar. 10.

Specific conductance: Maximum daily, 968 micromhos Nov. 17; minimum daily, 190 micromhos Mar. 10.

Water temperatures: Maximum, 86°F July 28; minimum, 34°F Dec. 30, Jan. 19.

REMARKS --(1) Specific conductance of samples collected in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum and minimum daily specific conductance for each 10-day period (October to December) or each week (January to September). Records of discharge are given for Ohio River at Huntington.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Alu- mi- num (Al)	Iron (Fe)	Man- ga- nese (Mn)	Cal- cium (Ca)	Mag- ne- sium (Mg)	Sodium (Na)	Po- tas- sium (K)	Lith- ium (Li)	Bi- car- bon- ate (HCO <sub>3</sub> )	Car- bon- ate (SO <sub>4</sub> )	Chloride (Cl)	Fluo- ride (F)	Nit- rate (NO <sub>3</sub> )	Phos- phor- ate (residue at 180°C) PO <sub>4</sub>	Hardness as CaCO <sub>3</sub>		To-Specific acid- ity (micro- mhos at 25°C)	pH or Col- or	De- ter- gent (MB AS)	
																	Cal- cium, car- mag- nesium ate	Non- car- bon- ate				
Oct. 2, 1963.	5990				60	12					24	0	188		8.0	--	422	199	180	702	6.0	--
Oct. 18.....	9860				--	--					--	--	178	--	--	0.09	--	--	--	745	6.3	0.1
Oct. 25.....	7920				64	12					28	0	182	99	7.5	--	464	209	186	776	6.1	--
Nov. 10.....	27400				--	--					--	--	153	--	--	.20	--	--	--	777	6.0	--
Nov. 17.....	17800				79	16					56	0	188	150	8.0	--	603	263	217	968	7.0	.1
Nov. 21.....	13800				--	--					--	--	182	--	--	.17	--	--	--	752	6.5	.1
Nov. 30.....	44700				49	12					28	0	164	60	9.8	--	364	172	149	602	6.6	--
Dec. 2.....	66600				52	10					38	0	132	75	9.5	--	380	171	140	636	6.5	--
Dec. 11.....	33600				--	--					22	0	101	--	--	.09	--	--	--	442	6.2	.1
Dec. 23.....	17800				28	7.7					63	--	35	--	5.1	--	200	102	84	344	6.3	--
Dec. 31.....	13700				--	--					--	--	100	--	--	.08	--	--	--	408	6.2	.0
Jan. 1, 1964.	13800				--	--					--	--	105	--	--	.12	--	--	--	427	6.6	.0
Jan. 9.....	87300				35	7.1					24	0	83	61	11	--	266	117	97	451	6.0	--
Jan. 15.....	45500				--	--					--	--	88	--	--	.10	--	--	--	328	7.1	.0
Jan. 21.....	57100				--	--					--	--	86	--	--	.11	--	--	--	350	7.1	.0
Jan. 27.....	149000				--	--					--	--	--	--	--	--	--	--	--	262	--	--
Jan. 31.....	102000				--	--					--	--	76	--	--	.13	--	--	--	319	6.2	.0
Feb. 8.....	79700				--	--					--	--	60	--	--	.07	--	--	--	261	6.6	.0
Feb. 14.....	49000				--	--					--	--	61	--	--	.06	--	--	--	255	6.8	.0
Feb. 17.....	87700				--	--					--	--	64	--	--	--	--	--	--	271	6.2	.0
Feb. 22.....	62600				20	4.8					24	0	49	16	6.2	--	138	70	50	221	6.3	--
Feb. 26.....	28200				27	6.3					24	0	70	22	4.6	--	178	94	74	300	6.6	--

OHIO RIVER MAIN STEM--Continued  
3-2022. OHIO RIVER NEAR HUNTINGTON, W. VA.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		To-Specific conductance (micro-mhos at 25°C)	pH	Coliform or (MB AS)
																		Calcium, carbonate, magnesium	Non-carbonate			
Mar. 2, 1964.	36700					--	--					--	80	--	--	0.08	--	119	90	315	6.8	0.0
Mar. 8.....	340000					34	8.2					34	94	23	5.8	4.1	119	68	52	190	6.1	--
Mar. 10.....	379000					20	4.5					20	61	12	4.1	.07	--	--	--	231	7.0	.0
Mar. 20.....	259000					--	--					--	52	--	--	.08	--	--	--	297	7.2	.0
Mar. 28.....	112000					--	--					--	79	--	--	--	--	--	--	297	7.2	.0
Apr. 2.....	99100					34	8.8					32	90	22	4.7	--	202	121	95	330	7.6	--
Apr. 8.....	224000					--	--					--	130	--	0.8	--	--	--	--	293	6.4	.0
Apr. 18.....	73700					--	--					78	--	--	--	.06	--	--	--	295	7.3	.1
Apr. 20.....	154000					--	--					81	--	--	--	.11	--	--	--	290	7.7	.1
Apr. 22.....	237000					25	6.2					30	57	15	3.0	--	145	88	64	231	6.8	--
May 1.....	141000					--	--					--	80	--	--	.12	--	--	--	364	7.3	.0
May 6.....	101000					--	--					--	87	--	--	.12	--	--	--	354	7.8	.1
May 9.....	66000					32	10					32	89	20	2.8	--	210	121	95	317	7.0	--
May 16.....	54000					--	--					--	92	--	--	.09	--	--	--	366	7.0	.0
May 23.....	29400					--	--					--	110	--	--	.09	--	--	--	439	7.5	.0
May 30.....	25000					50	12					46	117	48	1.2	--	307	175	137	495	7.0	--
June 1.....	17800					--	--					--	115	--	--	.09	--	--	--	497	7.2	.1
June 13.....	18800					--	--					--	122	--	--	.10	--	--	--	526	7.1	.1
June 20.....	35200					58	15					53	156	63	4.8	--	394	206	163	614	7.5	.1
June 23.....	70400					--	--					--	142	--	--	.12	--	--	--	561	7.3	.1
June 29.....	17800					41	11					37	117	32	4.6	--	275	147	117	423	6.8	--
July 1.....	14700					43	12					46	123	36	4.5	--	287	157	119	463	7.1	--
July 2.....	14700					--	--					--	136	--	--	.09	--	--	--	480	7.4	.0
July 9.....	15600					--	--					--	155	--	--	.03	--	--	--	559	7.4	.1
July 13.....	21700					--	--					41	153	--	--	.13	--	--	--	541	7.5	.1
July 20.....	18500					--	--					--	160	--	--	.06	--	--	--	515	6.9	.1
July 30.....	12700					57	15					25	137	82	9.3	--	413	204	183	556	6.5	--
Aug. 5.....	31100					59	16					36	180	81	6.9	--	418	213	184	684	7.4	--
Aug. 10.....	16200					--	--					--	183	--	--	.15	--	--	--	651	7.0	.1
Aug. 14.....	12100					53	12					32	156	63	4.1	--	362	182	156	601	7.3	--
Aug. 18.....	11500					--	--					--	133	--	--	.10	--	--	--	622	7.1	.1
Aug. 24.....	21400					--	--					--	136	--	--	.11	--	--	--	620	7.0	.1

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement usually between 0700 and 0900)

[illegible]







## 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.

Water temperatures: October 1949 to March 1953, November 1960 to September 1964.

Sediment loads: October 1949 to March 1953, October 1960 to September 1964.

EXTREMES, 1949-64: Maximum daily, 87°; minimum daily, 87°; July 27, minimum freezing point Dec. 19, 31, Jan. 13, 14.

Sediment concentrations: Maximum daily, 2,120 ppm June 8; minimum daily, 2 ppm on several days during December, January, and May.

Sediment loads: Maximum daily, 78,100 tons Mar. 9; minimum daily, 1 ton on several days during October, November, January, and September.

EXTREMES, 1949-53, 1960-64.--Water temperatures: Maximum, 89°; July 21, 23, 1952, July 27, 1963; minimum, freezing point on several days during winter months during 1950, 1960-64.

Sediment concentrations (1952-53, 1960-64): Maximum daily, 3,360 ppm Mar. 12, 1963; minimum daily, 1 ppm on several days during April and May 1963.

Sediment loads (1952-53, 1960-64): Maximum daily, 402,000 tons Mar. 13, 1963; minimum daily, 1 ton on many days during 1952, September 1963, and 1964.

REMARKS.--Flow slightly regulated by Dewey Reservoir. Flow affected by ice Dec. 18-31, Jan. 1-5, 7-9, Feb. 1-5, Mar. 1.

Temperature (°F) of water, water year October 1963 to September 1964

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

## BIG SANDY RIVER BASIN--Continued

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

## Suspended sediment, water year October 1963 to September 1964

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..	52	17	2	44	12	1	3400	2010	18400
2..	48	18	2	46	10	1	1620	562	2460
3..	52	18	2	50	10	1	1000	162	437
4..	60	17	3	53	8	1	790	60	128
5..	90	16	4	81	12	3	690	34	63
6..	100	13	4	163	15	7	600	25	40
7..	70	13	2	163	18	8	510	18	25
8..	58	15	2	141	18	7	500	12	16
9..	55	14	2	155	16	7	413	9	10
10..	52	15	2	225	13	8	402	5	5
11..	45	15	2	219	14	8	432	3	3
12..	45	15	2	178	12	6	496	9	12
13..	44	16	2	146	8	3	575	12	19
14..	44	15	2	130	8	3	730	22	43
15..	42	18	2	100	10	3	832	40	90
16..	40	20	2	80	8	2	680	33	60
17..	37	16	2	70	10	2	514	10	14
18..	37	15	1	64	15	2	380	2	2
19..	35	15	1	60	13	2	320	7	6
20..	35	16	2	58	11	2	260	9	6
21..	34	16	1	60	12	2	210	8	4
22..	34	19	2	64	12	2	185	8	4
23..	31	17	1	64	10	2	170	7	3
24..	31	14	1	68	10	2	165	5	2
25..	33	15	1	70	10	2	165	4	2
26..	35	15	1	76	9	2	180	6	3
27..	36	14	1	84	8	2	210	4	2
28..	37	16	2	100	13	4	230	4	2
29..	37	15	1	150	18	7	250	3	2
30..	38	13	1	1650	1100	A 4900	260	3	2
31..	39	13	1	--	--	--	250	4	3
Total	1426	--	56	4612	--	5002	17419	--	21868
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..	230	2	1	900	23	56	2000	95	513
2..	190	2	1	790	23	49	2810	116	880
3..	210	2	1	720	17	33	4940	162	2160
4..	250	20	14	640	10	17	7130	384	7390
5..	390	8	8	600	6	10	10200	700	A 19000
6..	645	15	26	1330	70	S 408	11700	751	23700
7..	1400	178	S 825	3300	250	2230	10500	522	14800
8..	3000	1510	S 12900	3000	220	1780	9480	467	S 12800
9..	6000	945	S 15300	2300	205	1270	18300	1580	78100
10..	9320	1570	S 39500	2100	148	839	20900	862	48600
11..	9590	670	S 19000	2000	92	497	13600	385	14100
12..	4680	233	S 2940	2300	142	882	7320	287	5670
13..	2950	154	S 1230	2700	125	911	5280	189	2690
14..	2330	54	S 340	3200	160	A 1400	4450	161	1930
15..	1660	34	S 152	4470	229	2760	8500	287	6590
16..	1270	18	S 62	7550	500	S 10800	13100	442	15600
17..	1070	13	S 38	12100	847	27700	14000	279	10500
18..	1110	14	S 42	8470	373	8530	8650	165	3850
19..	1280	18	S 62	6390	226	3900	5130	104	1440
20..	1570	50	S 212	7710	268	5580	4270	81	934
21..	4990	530	S 8320	5000	172	2320	4850	109	1430
22..	7410	526	S 10500	3200	143	1240	5330	125	1800
23..	4950	201	S 2690	2600	112	786	5080	97	1330
24..	3320	114	S 1020	2300	68	422	4530	80	978
25..	2700	110	S 802	2000	55	297	3870	66	690
26..	3110	339	S 2850	1800	62	301	3320	68	610
27..	3160	244	S 2080	1700	67	308	3280	75	664
28..	2450	111	S 734	1600	56	242	2990	85	686
29..	2700	60	S 437	1500	60	243	2680	66	478
30..	1430	34	S 131	--	--	--	2420	48	314
31..	1130	23	S 70	--	--	--	2140	40	231
Total	86495	--	122288	94270	--	75811	222750	--	280458

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

## BIG SANDY RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..	1900	29	149	2020	31	169	748	39	S 95
2..	1770	24	115	1740	30	141	2810	529	S 4940
3..	1700	27	124	1520	26	107	4000	821	8870
4..	1980	54	289	1340	21	76	1400	250	945
5..	4650	330	S 4600	1180	14	45	900	84	204
6..	5300	282	4040	988	10	27	740	38	76
7..	4330	148	1730	886	11	26	700	33	62
8..	4500	116	1410	790	8	17	2890	2120	S 18100
9..	7430	378	7580	700	4	8	1900	743	4140
10..	7430	325	6520	630	2	3	1050	234	663
11..	5040	170	2310	580	2	3	660	80	142
12..	3850	78	811	565	3	4	500	58	78
13..	3150	56	476	570	6	9	450	52	63
14..	2930	47	372	802	11	24	420	42	48
15..	2820	50	381	754	8	16	395	37	39
16..	2340	42	265	640	6	10	413	28	31
17..	1950	36	190	530	5	7	376	24	24
18..	1850	48	240	472	2	2	342	37	34
19..	2760	61	454	428	3	3	367	28	28
20..	6350	282	S 5320	395	7	7	422	19	22
21..	10400	700	19600	373	8	8	380	20	20
22..	8200	364	8060	342	8	7	350	21	20
23..	5430	148	2170	461	38	S 54	310	33	28
24..	4230	98	1120	570	27	42	290	20	16
25..	3470	76	712	464	20	25	280	18	14
26..	3130	62	524	400	10	11	298	16	13
27..	2830	48	367	373	6	6	320	16	14
28..	2520	42	286	355	9	9	220	21	12
29..	2250	38	231	447	13	16	170	21	10
30..	2210	33	197	482	12	16	130	19	7
31..	--	--	--	472	16	20	--	--	--
Total	118700	--	70643	22269	--	918	24231	--	38758
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..	110	21	6	419	167	189	75	21	4
2..	95	20	5	360	221	215	86	18	4
3..	100	22	6	300	190	154	100	17	4
4..	90	21	5	934	400	B 1000	110	17	5
5..	85	19	4	766	185	383	90	17	4
6..	95	20	5	400	234	253	80	17	4
7..	100	18	5	300	137	111	70	15	3
8..	100	22	6	270	91	66	65	14	2
9..	105	18	5	250	80	54	60	13	2
10..	120	13	4	288	66	51	56	14	2
11..	208	14	8	240	58	38	51	13	2
12..	427	160	A 180	1090	2060	S 8340	45	16	2
13..	850	210	B 500	800	450	972	48	16	2
14..	645	160	279	600	386	625	53	14	2
15..	433	166	194	470	--	E 400	48	13	2
16..	300	208	168	370	212	212	44	13	2
17..	210	110	62	320	106	92	40	14	2
18..	170	58	27	270	86	63	39	14	1
19..	130	47	16	240	83	54	44	14	2
20..	105	36	10	200	70	38	52	16	2
21..	250	404	S 445	180	58	28	70	12	2
22..	940	--	E 1900	160	44	19	100	11	3
23..	814	563	1240	140	34	13	88	16	4
24..	496	--	E 500	130	31	11	74	21	4
25..	405	126	138	115	27	8	66	22	4
26..	330	94	84	100	26	7	80	24	5
27..	285	74	57	92	24	6	74	22	4
28..	288	74	58	85	22	5	72	18	3
29..	262	56	40	78	21	4	90	130	32
30..	315	62	53	74	22	4	2390	1630	10500
31..	510	94	129	70	23	4	--	--	--
Total	9373	--	6139	10111	--	13419	4360	--	10614
Total discharge for year (cfs-days).....									616016
Total load for year (tons).....									645974

E Estimated.

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

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 1963 to September 1964  
(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)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (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	
Dec. 1, 1963.....	1700			2840	1860	28	44	68	90	98	99	100				SBWC	
June 3, 1964.....	1800			3460	4992	55	85	96	99	99	99	100				SBWC	
Aug. 12.....	1300			1940	5600	42	53	72	86	97	99	99	100			SBWC	

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

LOCATION.--At city water plant, 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 water plant; 1,185 square miles at gaging station.

RECORDS AVAILABLE.--Water temperatures: October 1946 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 83°F June 23, 24, and July 26, 28; minimum, 36°F Dec. 21 and Jan. 15, 16.

EXTREMES, 1946-64.--Water temperatures: Maximum, 90°F July 29, 1949; minimum, freezing point on several days in 1947 and 1951.

Temperature (°F) of water, water year October 1963 to September 1964																																	
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
October.....		62	64	66	64	64	62	61	62	62	59	57	59	58	57	54	56	56	57	58	57	57	57	60	60	59	59	57	57	56	54	59	
November.....		57	52	46	46	50	53	55	54	53	50	52	51	48	47	47	44	44	50	52	55	54	55	59	53	48	50	52	49	54	47	51	
December.....		48	44	43	42	43	42	44	44	42	44	44	44	44	46	38	37	37	41	37	37	36	37	38	37	38	38	39	37	38	37	40	
January.....		38	39	37	39	38	38	39	40	38	37	40	38	37	36	36	37	37	38	39	40	40	42	43	46	44	45	42	42	41	39	39	
February.....		42	42	40	40	42	43	44	45	42	41	42	--	42	44	46	43	44	46	44	46	45	--	42	43	45	44	45	45	44	--	43	
March.....		44	42	52	54	50	50	49	49	52	50	50	48	51	51	49	49	48	47	49	49	47	48	49	52	56	50	51	51	48	45	49	
April.....		45	47	52	53	54	56	57	60	54	53	54	50	57	58	59	57	60	62	56	59	60	63	61	60	60	63	60	61	63	63	--	57
May.....		62	64	64	65	66	68	70	72	70	70	71	68	64	66	69	70	71	75	74	75	76	75	75	75	76	73	65	65	76	70	70	70
June.....		70	65	65	64	68	72	71	77	78	79	77	79	77	75	72	76	75	78	78	82	82	83	83	77	76	78	80	77	77	--	76	76
July.....		78	78	77	80	75	75	76	77	75	75	78	78	78	76	74	75	77	78	79	80	80	82	82	81	83	82	83	80	76	77	78	78
August.....		83	80	82	82	81	80	79	80	81	75	78	77	72	70	69	70	70	72	74	72	76	76	76	75	77	76	75	77	76	77	--	78
September.....		75	72	72	72	72	70	70	70	71	74	70	66	62	60	61	64	68	66	66	68	70	72	70	65	64	66	65	66	67	--	68	68

## 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 White Oak Creek, and 6.5 miles west of Greenup, Greenup County.

DRAINAGE AREA.--242 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1956 to September 1964.

TEMPERATURES, 1956-64.--October 1956 to September 1964: Maximum 85°F June 23; minimum, freezing point on several days in December and January. EXTREMES, 1956-64.--Maximum: Maximum daily, 1,800 ppm Aug. 12; minimum daily, no flow Sept. 25, 26.

Sediment concentrations: Maximum daily, 7,290 tons Mar. 5; minimum daily, 0 tons Sept. 25, 26.

Sediment loads: Maximum daily, 7,290 tons Mar. 5; minimum daily, 0 tons Sept. 25, 26.

EXTREMES, 1956-64.--Water temperatures: Maximum 85°F June 23, 1964; minimum, freezing point on many days during winter months.

Sediment concentrations: Maximum daily, 1,800 ppm Aug. 12, 1964; minimum daily, no flow Sept. 25, 26, 1964.

Sediment loads: Maximum daily, 31,600 tons Feb. 26, 1962; minimum daily, 0 tons Sept. 25, 26, 1964.

REMARKS.--Occasional regulation of low flow caused by withdrawal of water for cooling purposes by gas transmission plant above station. Flow affected by ice Dec. 15-27.

Temperature (°F) of water, water year October 1963 to September 1964

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	
October.....	70	65	65	62	63	67	67	65	65	68	--	64	63	60	65	65	--	68	61	62	64	65	64	64	62	63	67	--	60	52	67	64	
November.....	--	49	49	51	50	53	55	50	52	60	58	46	43	45	46	46	49	51	51	69	51	54	50	48	49	50	49	51	44	40	50	50	
December.....	40	40	38	41	48	45	44	38	35	35	40	--	32	--	34	32	32	32	32	35	35	32	32	32	32	37	35	--	35	32	35	36	
January.....	32	34	40	36	35	35	35	35	34	33	34	32	32	32	32	33	36	35	35	37	34	40	36	40	38	35	38	42	35	36	41	40	36
February.....	40	41	38	43	45	46	39	--	40	35	38	38	37	40	36	38	40	38	38	38	37	35	38	40	45	35	40	35	38	--	--	39	
March.....	40	40	40	48	35	45	49	48	40	30	40	45	40	40	40	40	40	40	40	40	40	40	40	45	45	45	40	45	35	35	40	41	
April.....	40	40	45	40	41	45	55	38	40	45	45	45	44	45	45	45	61	45	40	40	48	58	50	65	68	48	50	45	61	--	--	48	
May.....	63	64	67	70	70	75	75	75	--	66	70	--	67	71	70	73	69	72	72	73	70	75	75	73	75	73	55	68	70	68	--	--	70
June.....	65	65	66	--	--	--	70	78	78	80	80	81	80	78	80	75	75	75	77	80	80	72	85	78	79	81	81	81	81	80	--	--	77
July.....	81	80	81	80	81	77	72	78	75	80	75	72	75	74	73	75	83	83	80	77	73	80	80	82	82	82	83	82	81	80	78	79	
August.....	80	80	78	78	80	80	79	80	79	80	--	68	67	70	74	73	74	78	77	78	77	76	77	78	75	72	74	75	75	78	78	79	
September.....	78	79	78	80	78	79	78	79	78	78	77	75	78	78	77	78	78	76	77	76	77	76	77	76	77	78	68	68	63	59	60	64	--

## TYGARTS CREEK BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964

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..	9.0	13	0.3	1.5	6	T	9.0	16	0.4
2..	7.0	12	.2	1.5	7	T	13	16	.6
3..	5.5	7	.1	1.5	7	T	17	16	.7
4..	4.5	7	.1	1.5	8	T	15	16	.6
5..	4.0	8	.1	1.5	7	T	14	14	.5
6..	3.5	7	.1	3.5	--	E 0.1	11	12	.4
7..	3.0	8	.1	3.5	5	T	10	10	.3
8..	2.5	6	T	3.5	5	T	9.6	13	.3
9..	2.1	6	T	3.5	4	T	9.0	15	.4
10..	1.9	9	T	3.5	4	T	8.6	14	.3
11..	1.7	11	.1	3.0	5	T	7.6	3	.1
12..	1.6	7	T	3.0	6	T	8.1	2	T
13..	1.5	4	T	3.0	3	T	7.6	2	T
14..	1.4	8	T	3.0	2	T	7.2	1	T
15..	1.3	4	T	3.0	6	T	7.0	2	T
16..	1.2	4	T	3.0	--	E .1	6.5	1	T
17..	1.2	7	T	3.0	--	E .1	6.0	1	T
18..	1.1	7	T	3.0	--	E .1	5.5	2	T
19..	1.1	5	T	3.3	8	.1	5.0	2	T
20..	1.1	5	T	3.3	24	.2	4.5	2	T
21..	1.0	3	T	3.3	13	.1	4.5	2	T
22..	1.0	5	T	3.3	10	.1	4.0	3	T
23..	1.0	5	T	3.6	10	.1	4.0	3	T
24..	1.0	11	T	3.6	11	.1	4.5	4	T
25..	1.0	7	T	3.6	5	T	4.5	4	T
26..	.9	7	T	3.6	3	T	5.0	3	T
27..	.9	6	T	3.6	9	.1	5.0	4	.1
28..	.9	7	T	3.6	19	.2	5.4	5	.1
29..	.9	7	T	5.0	18	.2	5.4	5	T
30..	.9	11	T	7.6	22	.4	5.4	3	T
31..	.9	8	T	--	--	--	5.4	3	T
Total	66.6	--	1.6	96.4	--	2.6	234.3	--	5.5
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..	5.4	3	T	60	12	1.9	68	2	0.4
2..	6.3	4	0.1	63	12	2.0	135	5	1.8
3..	8.6	6	.1	66	8	1.4	1100	130	457
4..	15	6	.2	62	7	1.2	3450	577	5370
5..	24	5	.3	54	8	1.2	6750	400	7290
6..	41	7	.8	196	20	S 30	2700	281	S 2260
7..	215	55	A 30	1630	690	S 3210	685	110	203
8..	341	65	A 60	780	272	S 636	1080	137	S 432
9..	238	42	27	453	63	77	3500	326	3080
10..	609	130	214	318	24	21	4620	283	S 3530
11..	300	72	58	266	20	14	3300	130	S 1300
12..	150	24	10	202	13	7.1	895	62	150
13..	100	16	4.3	199	7	3.8	525	28	40
14..	50	18	2.4	336	12	11	525	28	40
15..	30	23	1.9	529	20	28	1050	77	S 251
16..	22	16	1.0	895	75	181	1020	83	228
17..	20	9	.5	994	70	180	525	43	61
18..	17	13	.6	665	34	61	493	16	21
19..	17	14	.6	577	16	25	373	12	12
20..	36	13	1.3	465	12	15	318	10	8.6
21..	497	74	S 108	385	7	7.3	385	8	8.3
22..	421	63	72	318	7	6.0	665	--	E 80
23..	297	54	43	262	6	4.2	541	17	25
24..	234	20	13	220	5	3.0	433	16	19
25..	241	16	10	178	4	1.9	365	11	11
26..	250	17	11	140	4	1.5	361	8	7.8
27..	185	18	9.0	115	4	1.2	308	7	5.8
28..	123	15	5.0	95	4	1.0	244	6	4.0
29..	91	16	3.9	75	4	.8	216	5	2.9
30..	69	12	2.2	--	--	--	192	6	3.1
31..	60	8	1.3	--	--	--	168	4	1.8
Total	4713.3	--	691.5	10558	--	4534.5	36990	--	24904.5

E Estimated.

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

## TYGARTS CREEK BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..	144	5	1.9	453	11	13	31	7	0.6
2..	135	6	2.2	357	7	6.7	31	6	.5
3..	144	9	3.5	286	8	6.2	29	5	.4
4..	227	11	6.7	230	8	5.0	28	5	.4
5..	202	8	4.4	185	12	6.0	27	5	.4
6..	185	9	4.5	144	7	2.7	26	5	.4
7..	202	13	7.1	120	5	1.6	25	5	.3
8..	638	60	S 109	105	5	1.4	24	13	.8
9..	545	43	63	89	4	1.0	22	11	.6
10..	353	34	32	75	4	.8	20	10	.5
11..	272	36	26	66	7	1.2	19	12	.6
12..	220	21	12	60	11	1.8	17	16	.7
13..	199	17	9.1	57	16	2.5	17	12	.6
14..	230	14	8.7	60	14	2.3	16	6	.2
15..	224	14	8.4	55	13	1.9	16	9	.4
16..	185	14	7.0	51	14	1.9	30	17	S 2.0
17..	160	13	5.6	44	13	1.5	54	19	2.8
18..	160	14	6.0	40	12	1.3	34	14	1.3
19..	1220	278	S 1620	35	12	1.1	27	16	1.2
20..	2480	569	3810	32	13	1.1	22	17	1.0
21..	1090	149	S 508	30	13	1.0	19	17	.9
22..	645	41	71	27	14	1.0	19	14	.7
23..	497	24	32	28	12	.9	16	11	.5
24..	393	20	21	33	12	1.1	14	11	.4
25..	314	15	13	46	12	1.5	13	11	.4
26..	262	16	11	48	12	1.6	12	10	.3
27..	381	17	17	33	10	.9	20	17	.9
28..	881	45	A 110	28	11	.8	17	12	.6
29..	653	22	39	28	12	.9	13	13	.4
30..	553	20	30	27	7	.5	10	12	.3
31..	--	--	--	27	7	.5	--	--	--
Total	13794	--	6599.1	2899	--	71.7	668	--	21.1
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..	8.6	11	0.2	3.6	8	0.1	16	41	1.8
2..	8.1	11	.2	3.6	10	.1	13	32	1.1
3..	7.6	10	.2	3.9	22	.2	11	28	.8
4..	8.1	13	.3	4.2	14	.2	10	23	.6
5..	6.8	14	.2	8.8	7	.2	7.6	17	.3
6..	5.8	10	.2	28	14	1.0	6.8	15	.3
7..	5.0	9	.1	14	5	.2	6.3	14	.2
8..	5.0	10	.1	8.1	6	.1	5.4	17	.2
9..	4.5	8	.1	6.3	11	.2	4.5	12	.1
10..	4.5	10	.1	5.4	11	.2	3.9	15	.2
11..	4.2	12	.1	7.0	8	S .2	3.3	12	.1
12..	5.0	10	.1	1240	1800	A 6000	3.0	8	.1
13..	5.8	11	.2	449	437	S 584	3.0	11	.1
14..	5.8	15	.2	110	290	86	2.7	13	.1
15..	6.3	21	.4	55	230	34	2.4	13	.1
16..	5.8	24	.4	35	214	20	1.8	13	.1
17..	5.4	16	.2	27	168	12	1.5	7	T
18..	5.8	16	.2	20	163	8.8	2.1	6	T
19..	5.8	17	.3	17	155	7.1	2.1	5	T
20..	5.8	21	.3	14	131	5.0	1.8	4	T
21..	5.4	24	.3	12	109	3.5	2.1	9	.1
22..	5.4	17	.2	20	68	4.0	1.5	4	T
23..	6.8	15	.3	417	420	A 470	1.4	3	T
24..	6.3	16	.3	311	350	B 290	.4	3	T
25..	5.4	18	.3	100	283	76	0	0	0
26..	4.2	19	.1	55	149	22	0	0	0
27..	2.2	7	T	38	106	11	.9	24	.1
28..	1.7	8	T	32	80	6.9	5.4	56	.8
29..	3.3	7	.1	25	64	4.3	46	90	A 11
30..	3.3	8	.1	21	41	2.3	318	55	A 45
31..	3.3	8	.1	19	41	2.1	--	--	--
Total	167.0	--	6.0	3109.9	--	7651.7	483.9	--	63.3

Total discharge for year (cfs-days)..... 73780.4  
 Total load for year (tons)..... 44553.1

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

T Less than 0.05 ton.

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 1963 to September 1964  
(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)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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
Feb. 7, 1964.....	1800			1770	615		50	63	77	88	95	98	99	100				SBWC
Feb. 7.....	1800			1770	615		14	28	58	81	95	100	--					SEN
Mar. 5.....	1800			7650	699		63	73	85	90	94	95	98	100				SBWC
Aug. 12.....	1730			1220	1720		60	74	87	96	99	100	--					SBWC
Aug. 12.....	1730			1220	1720		40	57	79	95	98	99	100	--				SEN

## SCIOTO RIVER BASIN

3-2268. OLENTANCY RIVER NEAR WORTHINGTON, OHIO

LOCATION.--Temperature recorder at gaging station on right bank, 30 feet downstream from Wilson Road Bridge, 1.5 miles northwest of Worthington, Franklin County, and 2.8 miles upstream from Rush Run.

DRAINAGE AREA.--497 square miles (revised).

RECORDS AVAILABLE.--Water temperatures: October 1955 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 86°F July 19, 24, 26, 27; minimum, freezing point on many days during December to February.

EXTREMES, 1953-64.--Water temperatures: Maximum, 88°F July 7, 1962; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Boron (B)	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at 25°C)	pH	Coliforms per million	Dissolved oxygen	
																		Calcium	Non-magnesium					
Sept. 29, 1964				0.18	0.34						222	0	149	64	1.0	5.1		524	334	152	825	8.1		11.3



SCIOTO RIVER BASIN--Continued  
 3-2268. OLENTANGY RIVER NEAR WORTHINGTON, OHIO--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964  
 (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	60	64	65	63	62	63	65	65	63	62	62	63	61	59	58	59	60	60	58	62	63	62	61	62	63	64	64	63	56	50	48	61	
Maximum	53	55	60	57	56	55	57	61	57	55	56	58	55	52	51	53	54	54	53	57	58	58	56	56	57	58	60	56	50	45	46	55	
Minimum	50	48	64	64	48	48	50	50	48	47	46	46	44	42	43	44	47	49	47	50	52	52	47	42	42	43	42	42	39	--	46	44	
November	48	44	41	42	44	46	48	48	45	43	44	40	40	40	41	42	43	47	46	45	47	50	47	42	40	40	41	39	37	--	44	44	
Maximum	38	38	37	36	36	37	36	34	34	34	34	34	35	34	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	34	34	34	
Minimum	37	36	37	36	35	35	36	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	
December	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	39	40	46	46	43	38	39	41	45	41	40	41	43	46	45	45	43	43	42	42	42	45	48	48	47	48	47	46	44	42	44	41	
Maximum	35	39	40	43	38	37	38	39	41	38	37	38	39	43	43	42	41	41	42	42	43	45	46	44	43	44	43	44	42	40	40	41	
Minimum	44	42	43	42	43	45	46	46	47	49	49	51	55	55	54	58	59	58	55	60	61	61	60	60	60	58	61	59	58	--	53	53	
February	38	40	41	39	41	41	43	43	41	42	44	47	48	49	51	50	50	57	55	54	55	56	56	57	58	57	57	58	--	49	49	49	
Maximum	61	63	65	65	66	69	68	70	69	66	67	67	67	64	67	68	69	71	71	69	73	75	76	74	73	73	69	68	67	69	69	69	
Minimum	57	59	59	59	62	63	65	65	66	65	63	64	61	59	63	65	66	65	62	66	70	71	70	69	69	65	61	62	65	64	64	64	
March	69	67	68	70	72	74	76	75	74	74	75	80	80	77	74	74	74	74	74	78	77	79	82	81	77	78	83	82	83	83	--	76	71
Maximum	64	63	61	64	66	68	70	70	69	70	70	74	77	70	70	72	72	72	74	75	74	77	77	77	70	71	73	75	76	77	--	71	71
Minimum	81	82	85	82	80	79	76	75	77	81	82	79	75	72	76	79	83	84	86	85	85	86	85	86	85	86	86	85	83	80	79	81	
April	76	75	77	76	71	71	70	69	73	72	73	71	69	68	69	73	74	76	78	81	80	77	79	78	78	80	80	81	79	75	73	75	75
May	72	74	77	78	74	73	74	71	70	72	69	66	62	65	66	70	68	67	69	72	71	70	71	69	73	75	75	77	71	71	71	71	71
June	78	75	77	78	78	75	76	77	79	79	76	70	68	68	65	66	70	68	69	74	73	74	70	65	66	65	60	60	62	--	71	71	
July	73	69	70	72	72	68	68	70	71	72	70	66	61	60	60	60	63	66	65	65	67	70	70	62	59	59	60	57	57	56	--	65	65
August	73	69	70	72	72	68	68	70	71	72	70	66	61	60	60	60	63	66	65	65	67	70	70	62	59	59	60	57	57	56	--	65	65
September	73	69	70	72	72	68	68	70	71	72	70	66	61	60	60	60	63	66	65	65	67	70	70	62	59	59	60	57	57	56	--	65	65
Maximum	73	69	70	72	72	68	68	70	71	72	70	66	61	60	60	60	63	66	65	65	67	70	70	62	59	59	60	57	57	56	--	65	65
Minimum	73	69	70	72	72	68	68	70	71	72	70	66	61	60	60	60	63	66	65	65	67	70	70	62	59	59	60	57	57	56	--	65	65

## 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 (revised).--189 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1963 to September 1964. October 1960 to September 1963, unpublished.

Sediment loads: October 1960 to September 1964. Maximum, 85 $\frac{1}{2}$  ppm July 20, 24, 29; minimum, freezing point Dec. 7, 18, 27, Jan. 3.

EXTREMES, 1963-64.--Water temperatures: Maximum daily, 1,100 ppm June 14; minimum daily, 2 ppm Nov. 23, 24, Dec. 5.

Sediment concentrations: Maximum daily, 1,100 ppm June 14; minimum daily, less than 0.05 ton on several days October to December.

Sediment loads: Maximum daily, 13,400 tons Mar. 10; minimum daily, less than 0.05 ton on several days October to December.

EXTREMES, 1960-64.--Water temperatures (1963-64): Maximum, 85 $\frac{1}{2}$  ppm July 20, 24, 29, 1964; minimum, freezing point Dec. 7, 18, 27, 1963, Jan. 3, 1964.

Sediment concentrations: Maximum daily, 1,100 ppm June 14, 1964; minimum daily, 2 ppm on several days during 1960-63.

Sediment loads: Maximum daily, 13,400 tons Mar. 10, 1964; minimum daily, less than 0.05 ton on several days during October and

December 1960, October to December 1963.

Temperature ( $^{\circ}$ F) of water, water year October 1963 to September 1964

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

## SCIOTO RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964  
(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..	2.9	23	0.2	4.5	59	0.7	6.8	5	0.1
2..	3.1	52	.4	4.5	54	.6	5.4	5	.1
3..	2.7	50	.4	4.3	53	.6	5.0	4	.1
4..	2.7	47	.3	4.3	53	.6	5.4	3	T
5..	2.9	45	.4	5.4	37	.5	5.4	2	T
6..	3.8	43	.4	5.4	36	.5	5.4	5	.1
7..	3.1	42	.4	4.0	36	.4	5.4	11	.2
8..	3.5	37	.3	4.0	36	.4	12	15	T
9..	3.5	31	.3	4.0	34	.4	11	14	T
10..	3.1	26	.2	4.3	32	.4	8.7	12	.3
11..	3.5	23	.2	3.8	30	.3	6.3	8	.1
12..	3.1	22	.2	4.3	28	.3	8.7	7	.2
13..	3.1	15	.1	4.3	27	.3	8.0	9	.2
14..	3.1	9	.1	6.3	24	.4	7.4	12	.2
15..	3.8	4	T	5.4	20	.3	5.9	13	.2
16..	4.0	3	T	5.0	17	.2	5.4	16	.2
17..	3.3	3	T	5.0	13	.2	5.0	18	.2
18..	3.3	4	T	5.0	13	.2	5.0	21	.3
19..	3.5	6	.1	5.0	13	.2	5.0	21	.3
20..	3.5	10	.1	5.4	14	.2	4.3	19	.2
21..	3.3	23	.2	5.9	15	.2	3.8	16	.2
22..	3.8	38	.4	5.4	8	.1	3.5	16	.2
23..	3.8	46	.5	6.3	2	T	3.8	12	.1
24..	3.5	58	.5	6.3	2	T	3.8	14	.1
25..	3.3	63	.6	5.9	3	T	3.5	22	.2
26..	3.5	62	.6	5.4	3	T	4.5	32	.4
27..	3.8	60	.6	5.4	4	.1	5.0	36	.5
28..	3.5	60	.6	5.9	5	.1	4.3	36	.4
29..	3.5	57	.5	9.3	5	.1	3.3	35	.3
30..	3.8	35	.4	7.4	5	.1	3.3	35	.3
31..	3.3	55	.5	--	--	--	2.7	35	.2
Total	104.6	--	9.6	157.4	--	8.6	173.0	--	6.1
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..	3.3	34	0.3	4.3	10	0.1	12	10	0.3
2..	3.3	33	.3	4.0	10	.1	17	12	.6
3..	8.0	48	1.1	4.0	7	.1	37	19	2.0
4..	8.0	48	1.0	4.3	7	.1	502	445	S
5..	3.5	45	.4	4.5	8	.1	2720	1030	S
6..	6.8	44	.8	31	40	S	5.9	1190	228
7..	5.9	23	.4	24	30	1.9	296	112	90
8..	3.1	20	.2	16	25	1.1	182	62	30
9..	18	31	1.5	12	25	.8	2900	546	S
10..	15	28	1.1	11	28	.8	7090	701	4760
11..	4.0	24	.2	8.7	27	.6	5100	267	S
12..	2.7	24	.2	6.8	26	.5	760	116	3860
13..	2.5	23	.2	8.0	23	.5	685	78	238
14..	2.5	25	.2	8.7	20	.5	628	--	144
15..	2.1	26	.1	6.8	20	.4	1030	--	200
16..	2.0	25	.1	9.3	18	.4	588	110	650
17..	1.8	25	.1	11	17	.5	332	65	175
18..	1.8	25	.1	8.7	17	.4	231	43	58
19..	3.1	26	.2	11	17	.5	168	31	27
20..	31	28	.2	12	17	.5	145	28	11
21..	12	33	2.3	8.0	17	.4	231	61	38
22..	7.4	38	.8	6.8	14	.2	357	83	80
23..	6.8	35	.6	6.8	11	.2	245	42	28
24..	12	17	.6	6.3	9	.2	180	34	16
25..	34	20	1.8	6.8	8	.1	151	--	15
26..	26	25	1.8	9.9	8	.2	192	90	A
27..	18	24	1.2	9.9	8	.2	248	--	45
28..	8.7	22	.5	8.7	8	.2	162	--	50
29..	6.8	22	.4	8.0	8	.2	131	25	18
30..	6.3	19	.3	--	--	--	113	23	9
31..	4.5	12	.1	--	--	--	103	21	7
Total	270.9	--	19.1	277.3	--	17.7	26726	--	33267.9

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

## SCIOTO RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..	103	20	6.0	580	86	135	26	12	0.8
2..	835	--	1600	325	58	51	27	12	.9
3..	2710	418	3730	205	47	26	23	10	.6
4..	1640	180	797	145	35	14	20	10	.5
5..	512	100	138	113	24	7.3	18	10	.5
6..	488	80	105	88	15	3.6	39	--	4
7..	544	52	76	73	11	2.2	35	--	3
8..	350	34	32	68	--	6	121	50	A 18
9..	231	27	17	55	22	3.3	131	48	17
10..	168	28	13	46	21	2.6	77	--	8
11..	134	26	9.4	38	20	2.0	44	26	3.1
12..	110	22	6.5	108	--	25	31	27	2.2
13..	100	16	4.3	142	70	35	49	30	4.0
14..	93	15	3.8	592	244	528	376	1100	B 1100
15..	79	20	4.3	504	112	164	1730	996	S 4340
16..	66	24	4.3	218	63	37	1440	285	S 1450
17..	60	15	2.4	192	50	26	388	117	122
18..	77	--	6	211	48	27	294	--	190
19..	325	--	55	118	42	13	301	390	A 320
20..	1640	700	A 3100	79	36	7.7	137	105	39
21..	5070	449	6150	58	29	4.5	297	--	150
22..	2550	204	1400	46	16	2.0	269	160	A 120
23..	1210	140	457	71	--	20	269	230	230
24..	484	96	125	71	--	12	118	168	54
25..	311	72	60	66	38	6.8	66	76	14
26..	218	51	30	60	25	4.0	51	52	7.2
27..	192	34	18	77	24	5.0	38	46	4.7
28..	241	33	21	105	36	10	27	44	3.2
29..	235	25	16	56	23	3.5	28	42	3.2
30..	392	78	S 92	38	19	1.9	35	29	2.7
31..	--	--	--	31	15	1.2	--	--	--
Total	21168	--	18079.0	4579	--	1186.6	6505	--	8212.6
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..	34	39	3.6	18	17	0.8	4.7	25	0.3
2..	22	32	1.9	71	--	110	4.0	39	.4
3..	55	--	20	228	260	A 160	3.5	43	.4
4..	62	--	11	38	84	8.6	3.6	37	.4
5..	27	--	3	14	73	2.8	3.7	43	.4
6..	22	31	1.8	12	52	2.5	3.9	32	.3
7..	32	41	S 4.6	9.6	40	1.0	2.7	35	.2
8..	27	22	1.6	9.0	35	.9	5.7	44	.7
9..	71	24	1.4	12	36	1.2	4.9	48	.6
10..	17	18	.8	8.1	42	.9	3.5	43	.4
11..	15	14	.6	8.5	36	.8	2.4	47	.3
12..	28	--	2	11	52	1.5	2.7	47	.3
13..	27	21	1.5	6.4	49	.8	4.2	45	.5
14..	19	23	1.2	7.5	43	.9	3.9	46	.5
15..	24	90	B 6	8.9	37	.9	3.3	56	.5
16..	32	30	B 3	7.4	32	.6	4.4	45	.5
17..	23	30	A 2	7.5	29	.6	3.5	37	.3
18..	42	--	4	9.3	40	1.0	7.6	47	1.0
19..	22	36	2.1	7.0	30	.6	33	--	7
20..	16	43	1.8	5.9	38	.6	7.1	56	1.1
21..	151	185	S 301	3.1	57	.5	4.7	61	.8
22..	10	36	1.0	8.8	--	2	8.8	50	1.2
23..	11	18	.5	3.5	30	.3	7.6	45	.9
24..	6.8	12	.2	3.3	45	.4	4.6	52	.6
25..	6.5	11	.2	3.8	48	.5	4.1	42	.5
26..	5.1	18	.2	3.5	35	.3	4.2	33	.4
27..	5.1	31	.4	3.7	44	.4	5.2	31	.4
28..	53	108	S 66	3.4	40	.4	8.3	50	1.1
29..	6.1	28	.5	3.1	27	.2	7.2	41	.8
30..	41	44	S 7.4	2.6	22	.2	4.3	33	.4
31..	41	33	3.6	2.9	32	.2	--	--	--
Total	903.6	--	454.9	540.8	--	302.4	171.3	--	23.2

Total discharge for year (cfs-days)..... 61576.9  
 Total load for year (tons)..... 61886.9

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

SCIOTO RIVER BASIN--Continued  
3-2290. ALUM CREEK AT COLUMBUS, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964  
(Methods of analysis: B, by hydrometer; C, gravimetrically 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)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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. 5, 1964.....	0930			2950	1170		53	62	75	85	95	98	99	100			SBWC	
Mar. 5.....	0930			2950	1170		51	29	50	73	93	94	98	100			SEN	
Mar. 10.....	0845			6790	748		49	57	71	80	91	95	98	100			SBWC	
Apr. 3.....	1515			2980	368		56	66	77	87	96	97	99	100			SBWC	
June 14.....	2115			636	1440		53	63	80	94	99	99	100	--			SBWC	
June 14.....	2115			636	1440		51	61	81	92	98	98	100	--			SEN	



## SCIOTO RIVER BASIN--Continued

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

LOCATION.--At gaging station on left bank at highway bridge, 0.8 mile downstream from Walnut Creek, and 1.2 miles north of Higby, Ross County.

DRAINAGE AREA (revised).--5,131 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1953 to September 1964.

EXTREMES 1953-64.--Water temperatures: Maximum, 90°F July 25, Aug. 2; minimum, freezing point on several days during December and January.

Sediment concentrations: Maximum daily, 2,020 ppm Mar. 5; minimum daily, 2 ppm Oct. 28, Aug. 15.

Sediment loads: Maximum daily, 241,000 tons Mar. 11; minimum daily, 2 tons Oct. 28, Aug. 15.

EXTREMES 1953-64.--Water temperatures: Maximum, 90°F July 25, Aug. 2, 1964; 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, Deikware, Hoover, and Rocky Fork Reservoirs.

	Temperature (°F) of water, water year October 1963 to September 1964																																
	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	68	69	66	70	64	70	--	69	70	65	66	66	--	65	66	65	65	65	65	65	66	69	69	70	66	64	62	63	55	66		
November	55	54	55	55	56	55	54	54	56	54	56	--	--	52	54	50	54	54	55	56	50	50	52	50	52	54	54	46	51	53	53		
December	50	--	48	43	45	46	42	38	40	40	40	38	32	--	32	--	32	--	32	32	32	32	32	35	34	35	32	32	37	50	50		
January	35	36	40	38	35	35	40	35	36	36	34	34	32	--	32	36	40	44	44	40	40	42	--	40	42	41	38	36	40	40	41	38	
February	42	42	38	38	40	42	41	44	--	42	40	38	40	42	38	--	40	41	38	38	36	38	40	42	40	39	39	40	--	47	47		
March	50	48	50	50	46	45	46	45	45	46	45	44	--	50	49	49	48	42	44	46	--	46	--	52	55	45	44	46	--	42	47	47	
April	44	47	44	46	46	51	--	52	48	51	53	55	--	--	60	66	66	66	67	60	62	65	66	63	64	60	63	66	62	63	--	58	
May	66	66	--	66	67	71	70	72	--	70	71	73	69	66	--	71	70	72	--	73	--	76	80	72	70	75	--	69	68	--	64	--	
June	--	69	71	--	74	76	72	74	--	80	84	81	84	76	71	73	74	78	83	85	84	80	81	83	88	86	85	84	83	--	79	79	
July	82	82	83	80	81	79	78	80	81	81	80	73	75	76	--	84	79	80	80	87	84	87	88	86	90	88	87	84	85	86	86	82	
August	86	90	86	88	88	88	86	84	79	80	83	--	71	75	70	72	73	71	78	78	79	80	80	84	80	81	84	85	82	84	81	81	
September	78	64	78	86	87	85	86	81	81	76	78	79	76	78	78	79	70	71	--	--	--	76	76	--	--	68	68	70	70	68	66	--	76

Temperature (°F) of water, water year October 1963 to September 1964

## SCIOTO RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964

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..	346	10	9	326	6	5	379	20	20
2..	342	9	8	317	5	4	382	20	21
3..	342	14	13	328	7	6	371	20	20
4..	342	16	15	328	5	4	369	19	19
5..	345	12	11	325	10	9	381	16	16
6..	342	9	8	324	15	13	372	17	17
7..	335	5	4	342	16	15	371	15	15
8..	328	3	3	346	15	14	373	11	11
9..	326	6	5	349	16	15	378	10	10
10..	333	6	5	357	22	21	399	14	15
11..	330	6	5	371	25	25	426	14	16
12..	329	7	6	359	22	21	415	17	19
13..	325	7	6	347	12	11	398	16	17
14..	324	5	4	351	10	9	397	20	21
15..	323	9	8	355	12	12	384	22	23
16..	318	12	10	361	10	10	359	26	25
17..	318	12	10	358	11	11	340	31	28
18..	315	10	8	358	13	12	373	27	27
19..	308	9	7	356	10	10	416	23	26
20..	311	9	8	360	11	11	443	25	30
21..	313	7	6	369	11	11	473	20	26
22..	310	7	6	364	20	20	484	15	20
23..	306	6	5	365	28	28	493	25	33
24..	307	5	4	362	20	20	484	33	43
25..	312	5	4	357	13	12	463	21	26
26..	310	4	3	352	13	12	482	14	18
27..	323	4	3	344	17	16	507	22	30
28..	323	2	2	353	17	16	517	30	42
29..	312	3	2	394	15	16	534	25	36
30..	310	5	4	380	17	17	489	23	30
31..	318	7	6	--	--	--	422	22	25
Total	10026	--	198	10558	--	406	13074	--	725
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..	424	25	29	735	9	18	569	13	20
2..	404	25	27	705	6	11	571	9	14
3..	446	20	24	662	7	12	612	10	16
4..	823	27	60	604	12	20	2980	366	5360
5..	772	46	96	564	15	23	24700	2020	135000
6..	731	52	103	596	10	16	27600	1020	76000
7..	1090	52	153	723	8	16	24700	450	30000
8..	1090	70	206	1010	12	33	19100	260	13400
9..	885	65	155	910	14	34	30700	915	87800
10..	1210	91	297	789	16	34	86100	990	230000
11..	1010	61	166	704	20	38	122000	733	241000
12..	829	35	78	649	19	33	96800	410	107000
13..	607	33	54	624	19	32	58200	276	43400
14..	552	31	46	630	15	26	35700	218	21000
15..	385	26	38	628	11	19	29100	193	15200
16..	537	18	26	657	12	21	23900	187	12100
17..	527	12	17	665	16	29	22200	174	10400
18..	497	12	16	674	12	22	18400	161	8000
19..	495	12	16	683	21	39	14300	154	5940
20..	1040	--	E 360	678	27	49	11800	152	4840
21..	2420	270	A 1800	678	27	49	10800	--	E 4500
22..	1770	92	440	654	23	41	11200	195	5900
23..	1440	63	245	613	16	26	11400	180	5540
24..	1260	42	143	586	17	27	9180	112	2780
25..	1200	24	78	566	19	29	8910	91	2200
26..	1180	20	64	573	19	29	10000	228	6160
27..	1140	18	55	583	21	33	8350	120	2700
28..	1000	20	54	588	21	33	7130	78	1500
29..	890	19	46	578	24	37	6240	69	1160
30..	854	13	30	--	--	--	5450	43	633
31..	803	15	32	--	--	--	4860	36	472
Total	28461	--	4954	19309	--	829	743552	--	1080035

E Estimated.

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.



## SCIOTO RIVER BASIN--Continued

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

## Suspended sediment, water year October 1963 to September 1964--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..	4390	33	391	12100	99	3230	1520	6	25
2..	4390	39	462	10300	133	3700	1380	9	34
3..	14500	1020	S 47600	9320	116	2920	1290	15	52
4..	26800	609	S 44800	6830	85	1570	1190	16	51
5..	27600	243	18100	5270	66	939	1130	12	37
6..	27400	163	12100	4300	56	650	1080	10	29
7..	25600	--	E 19000	3660	33	326	1160	9	28
8..	30200	618	50400	3310	27	241	1220	12	40
9..	17800	172	8270	3090	33	275	1320	13	46
10..	10800	116	3380	2900	29	227	2000	15	81
11..	8240	74	1650	2660	20	144	2020	18	98
12..	6260	85	1440	2500	16	108	1600	13	56
13..	5320	82	1180	2550	26	179	1370	13	48
14..	4750	55	705	2660	31	223	1340	13	47
15..	4250	55	631	4160	--	E 750	1830	117	S 791
16..	3810	50	514	4490	86	1040	8480	440	S 8810
17..	3460	45	420	3900	78	821	12900	311	10800
18..	3260	42	370	3120	69	581	8920	154	3710
19..	7380	250	S 7120	3040	57	468	5330	101	1450
20..	32600	761	67000	2800	42	318	4440	66	791
21..	40700	611	67100	2470	32	213	3150	69	587
22..	42300	425	48500	2130	28	161	2910	60	471
23..	47600	369	47400	1890	29	148	3500	58	548
24..	44300	272	32500	1840	24	119	3440	54	502
25..	33700	182	16600	1870	8	40	3240	53	464
26..	24800	155	10400	1840	5	25	2580	35	244
27..	19100	148	7630	1690	6	27	2170	23	135
28..	14800	129	5150	1640	7	31	1800	25	122
29..	13100	115	4070	1570	5	20	1580	22	64
30..	12200	111	3660	1580	5	21	1440	17	66
31..	--	--	--	1640	5	22	--	--	--
Total	561410	--	528443	113120	--	19537	87330	--	30257
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..	1290	17	59	566	7	11	391	10	10
2..	1170	13	41	528	12	17	383	9	9
3..	1130	9	27	523	12	17	386	10	10
4..	1050	12	34	1020	17	47	385	10	10
5..	1070	12	35	1150	10	31	378	38	39
6..	1040	9	25	715	3	6	370	18	18
7..	885	9	22	564	4	6	361	6	6
8..	843	10	23	509	4	5	343	7	6
9..	884	11	26	484	4	5	344	9	8
10..	859	9	21	467	5	6	343	11	10
11..	797	9	19	460	5	6	353	9	8
12..	773	9	19	475	6	8	355	10	10
13..	793	11	24	465	7	9	354	12	11
14..	876	30	71	479	4	5	351	11	10
15..	827	16	36	468	2	2	341	10	9
16..	747	8	16	451	3	4	334	10	9
17..	731	9	18	438	7	8	337	7	6
18..	1080	11	32	430	6	7	342	5	5
19..	835	8	18	422	7	8	361	6	6
20..	708	5	10	431	6	7	445	--	E 7
21..	645	6	10	435	8	9	540	6	9
22..	638	5	9	462	9	11	420	11	12
23..	997	6	16	457	7	9	384	8	8
24..	762	6	12	482	6	8	375	6	6
25..	639	6	10	470	4	5	377	8	8
26..	605	7	11	446	3	4	368	7	7
27..	580	10	16	428	5	6	356	10	10
28..	546	10	15	431	5	6	365	10	10
29..	563	10	15	420	8	9	362	7	7
30..	783	10	21	411	14	16	373	5	5
31..	634	8	14	399	11	12	--	--	--
Total	25780	--	725	15886	--	310	11177	--	289

Total discharge for year (cfs-days).....

1639683

Total load for year (tons).....

1668708

E Estimated.

S Computed by subdividing day.

## SCIOTO RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1963 to September 1964

(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)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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	
Mar. 5, 1964.....	1630			28500	2140		51	56	68	78	90	94	97	100			SBWC
Mar. 5.....	1630			28500	2140		19	31	48	71	89	90	96	100			SBWC
Apr. 8.....	1000			33200	807		57	68	77	85	92	97	98	100			SBWC

## 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 River, Scioto County, Ohio.

DRAINAGE AREA (revised).--5,178 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 1,020 micromhos Dec. 22; minimum daily, 241 micromhos Apr. 21.

Water temperatures: Maximum, 82°F July 25, 26, 28, 29, Aug. 3, 4; minimum, freezing point on several days during December and January.

EXTREMES, 1956-64.--Specific conductance: Maximum daily, 1,020 micromhos Dec. 22, 1963; 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.--Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis as follows: (1) maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) composite analysis of all daily samples for the month.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)
														Calcium	Non-carbonate	
Oct. 15, 1963.....								308	146	52	0.7	4.4	578	346	93	922
Oct. 19.....								240	115	40	.5	7.0	432	281	84	736
Oct. 21.....								281	124	55	1.0	5.7	536	328	92	878
Nov. 9.....								296	143	62	1.4	8.0	592	344	108	952
Nov. 25.....								288	148	56	1.2	10	580	364	128	920
Nov. 1-30.....								288	150							
Dec. 22.....								296	182	72	.9	17	594	377	134	1020
Dec. 30.....								264	112	50	.7	16	456	300	83	764
Dec. 1-22, 26-31.....								272	147	62	.9	14	532	330	107	889
Jan. 6, 1964.....								271	126	57	.6	.6	478	291	68	804
Jan. 23.....								177	78	52	.4	1.9	296	200	35	519
Jan. 1-31.....								206	106	51	.3	8.2	403	246	77	675
Feb. 7.....								218	102	32	.4	5.7	378	259	80	625
Feb. 28.....								232	110	46	.5	8.1	463	293	103	756
Feb. 1-29.....								232	108	38	.5	6.7	435	274	92	701
Mar. 2.....								235	118	61	.8	5.7	467	282	89	765
Mar. 5.....								98	42	12	.2	1.2	168	116	36	287
Mar. 1-9, 19-31.....								154	52	24	.4	12	293	204	78	473
Apr. 2.....								214	87	20	.3	11	358	282	106	563
Apr. 21.....								147	62	.0	.3	6.0	267	198	70	418
Apr. 1-30.....								156	62	12	.3	9.1				6.7



SCIOTO RIVER BASIN--Continued  
 3-2371. SCIOTO RIVER AT LUCASVILLE, OHIO--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964  
 (Once-daily measurement at approximately 1030)

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

## UPPER TWIN CREEK BASIN

## 3-2372.8. UPPER TWIN CREEK AT MCGAW, OHIO

LOCATION --At gaging station on right bank at bridge on U.S. Highway 52 at McGaw, Scioto County, 2 miles northeast of Buena Vista, and 2.8 miles up-stream from mouth.

DRAINAGE AREA --12.8 square miles.

RECORDS AVAILABLE --Water temperatures: October 1963 to September 1964.

EXTREMES, 1963-64. --Water temperatures: Maximum, 86°F July 27; minimum, 33°F on several days in February.

REMARKS. --No flow Oct. 1 to Jan. 9, May 27 to June 21, July 4-12, Aug. 6-11. Thermograph not operating Aug. 27 to Sept. 28.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Calcium	Non-magnesium			
Jan. 21, 1964.....								16	18	4.0	0.0	1.5	58	27	14	83	6.7	
Jan. 22.....								16	18	4.0	.0	1.6	56	29	16	81	6.3	
Feb. 7.....								10	18	2.0	.0	1.2	42	22	14	69	6.3	
Feb. 27.....								10	19	3.0	.0	1.1	36	23	15	73	6.3	
Mar. 5.....								7	14	1.5	.0	1.4	34	17	12	54	6.1	
Mar. 6.....								10	16	2.5	.0	2.6	34	21	13	64	6.2	
Mar. 9.....								17	14	2.0	.0	.6	36	16	10	49	6.1	
Apr. 9.....								11	18	4.0	.0	.4	36	22	13	82	7.4	
Sept. 16.....								28	30	4.0	.2	.5	95	51	28	143	7.7	

## UPPER TWIN CREEK BASIN--Continued

3-2372.8. UPPER TWIN CREEK AT MCGAW, OHIO--Continued

Temperature (°F) of water, water year October 1963 to September 1964  
(Continuous ethyl alcohol-actuated thermograph)

[illegible]

## UPPER TWIN CREEK BASIN--Continued

## 3-2372.8. UPPER TWIN CREEK AT MCGRAW, OHIO--Continued

Periodic determinations of suspended sediment, water year October 1963 to September 1964  
 (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)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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	
Jan. 9, 1964.....	1430			5.2	12	0.2											
Jan. 15.....	1530			1.2	2	T											
Jan. 21.....	1615			7.7	4	.1											
Jan. 22.....	1530			5.6	9	.1											
Feb. 7.....	1330			25	6	.4											
Feb. 27.....	1030			3.4	1	T											
Mar. 5.....	0905			25.4	62	42											
Mar. 6.....	0945			48	4	.5											
Mar. 9.....	1700			241	18	12											
Apr. 9.....	0900			20	1	.1											
May 12.....	1500			3.5	1	T											
T Less than 0.05 ton.																	

T Less than 0.05 ton.



## LICKING RIVER BASIN

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

LOCATION.--At gaging station near right bank 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 Tripiett Creek.

DRAINAGE AREA.--831 square miles.

RECORDS AVAILABLE.--Chemical analyses: September 1949 to August 1950.

Sediment records: November 1960 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 85°F June 23, 24; minimum, freezing point Jan. 22-29.

Sediment concentrations: Maximum daily, 547 ppm Apr. 20; minimum daily, 2 ppm on many days during November to January, May.

Sediment loads (1960-64): Maximum daily, 23,700 tons; minimum daily, less than 0.50 ton on many days during October to January, September.

EXTREMES, 1949-64.--Water temperatures: Maximum, 92°F July 19, 1951; minimum, freezing point on many days during winter months. Sediment concentrations (1960-64): Maximum daily, 1,070 ppm June 10, 1961; minimum daily, 1 ppm on several days during December 1960, November 1961, May, June, and September 1962, and April 1963.

Sediment loads (1960-64): Maximum daily, 23,700 tons; minimum daily, less than 0.50 ton on many days.

REMARKS.--Flow affected by ice Dec. 14-16, Jan. 16-19, 24-31, Feb. 1-4.

Temperature (°F) of water, water year October 1963 to September 1964  
(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	62	63	64	64	64	66	65	65	63	62	62	62	62	60	61	60	60	60	58	60	60	60	61	62	64	64	63	62	61	58	55	62
	59	59	61	61	59	59	59	60	60	59	59	60	59	58	58	57	57	57	57	58	58	58	59	59	60	60	61	58	55	53	59	
November	53	53	51	50	48	49	50	51	51	50	50	49	47	46	45	47	49	51	51	50	51	53	53	49	48	47	47	47	47	45	--	49
	53	51	49	47	48	48	49	50	50	49	49	48	47	45	45	45	45	45	45	45	45	45	45	45	45	47	47	47	47	45	--	48
December	43	42	42	42	42	42	42	42	40	39	40	40	40	40	38	37	36	36	36	36	35	35	35	34	34	34	34	34	34	34	38	
	42	41	42	41	42	41	40	41	40	39	39	39	40	38	37	36	36	36	36	35	35	35	34	34	34	34	34	34	34	34	37	
January	34	34	34	34	34	34	34	34	33	34	34	34	34	34	34	34	34	34	34	34	34	32	32	32	32	32	32	32	33	33	33	
	34	34	34	34	34	34	34	33	33	33	33	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	
February	34	34	34	34	34	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	34	34	34	34	34	34	34	34	34	
	35	34	34	34	34	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	
March	35	36	38	40	42	42	43	43	44	44	44	44	46	45	45	46	46	46	46	45	44	44	43	44	44	46	47	47	48	47	45	44
	34	35	36	38	40	42	43	43	43	44	44	44	44	45	45	46	46	46	46	45	44	43	43	43	44	44	46	47	47	47	45	43

LICKING RIVER BASIN--Continued  
 3-2495. LICKING RIVER AT FARMERS, KY.--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964--Continued

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	
44	44	46	47	49	51	54	54	53	53	53	52	52	53	55	55	58	58	55	56	57	57	57	57	57	57	57	57	58	58	--	54
Maximum	...																														
43	44	44	46	47	49	51	53	52	52	52	51	51	53	54	55	58	55	55	55	55	56	57	57	57	57	57	57	58	58	--	53
Minimum	...																														
58	57	59	61	63	65	66	66	66	66	66	66	65	64	65	67	68	70	71	72	73	73	73	73	75	75	73	73	68	67	67	
Maximum	...																														
57	57	57	59	60	61	63	64	65	64	64	65	63	62	62	64	65	66	69	69	69	71	72	71	72	71	73	68	64	66	65	
Minimum	...																														
66	65	67	68	68	70	73	74	77	78	78	78	79	80	80	77	76	78	81	81	84	85	85	84	81	81	82	82	81	--	77	
Maximum	...																														
65	64	64	65	66	68	69	72	73	77	77	76	77	76	77	76	78	77	73	75	74	78	80	82	81	78	77	78	79	79	--	75
Minimum	...																														
80	80	81	81	81	80	78	77	80	80	80	80	77	76	76	78	79	79	79	80	81	82	82	82	82	82	84	84	83	82	80	
Maximum	...																														
80	78	79	79	77	77	77	75	78	78	77	77	75	73	74	75	77	78	76	79	80	80	80	80	80	80	81	82	83	83	79	78
Minimum	...																														
81	81	84	84	84	84	82	81	81	79	79	79	76	72	71	69	71	73	73	75	74	74	74	74	74	74	74	75	77	78	78	77
Maximum	...																														
78	79	81	83	82	81	80	80	77	77	78	76	72	70	69	69	70	71	71	72	73	73	73	73	72	74	75	76	77	77	75	77
Minimum	...																														
77	74	72	72	74	74	75	74	75	78	75	72	69	66	66	67	65	64	65	68	69	68	67	64	63	61	61	59	60	--	66	
Maximum	...																														
74	72	71	71	72	71	71	71	71	71	71	69	65	62	60	61	63	64	65	67	64	65	67	64	61	59	60	59	58	59	--	69
Minimum	...																														

## LICKING RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964

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..	11	15	T	15	8	T	27	2	T
2..	11	12	T	15	8	T	34	2	T
3..	11	12	T	15	7	T	47	4	T
4..	9.9	12	T	15	6	T	71	5	T
5..	9.9	15	T	15	12	T	71	2	T
6..	8.8	14	T	16	8	T	42	2	T
7..	7.7	13	T	15	8	T	30	2	T
8..	7.7	15	T	14	8	T	30	2	T
9..	7.7	21	T	18	8	T	27	3	T
10..	7.7	12	T	19	7	T	30	2	T
11..	7.7	12	T	18	7	T	36	2	T
12..	7.7	12	T	18	7	T	41	2	T
13..	7.7	10	T	16	5	T	47	3	T
14..	8.8	8	T	18	5	T	43	3	T
15..	7.7	11	T	34	5	T	40	2	T
16..	8.8	12	T	28	6	T	37	2	T
17..	7.7	9	T	23	6	T	35	2	T
18..	6.6	11	T	20	8	T	33	2	T
19..	8.8	11	T	20	6	T	31	2	T
20..	8.8	13	T	16	6	T	29	2	T
21..	8.8	8	T	16	5	T	28	2	T
22..	8.8	10	T	16	5	T	27	2	T
23..	8.8	10	T	16	5	T	26	2	T
24..	8.8	10	T	16	5	T	25	2	T
25..	8.8	10	T	16	6	T	24	2	T
26..	12	11	T	15	3	T	23	2	T
27..	11	12	T	15	2	T	23	2	T
28..	12	13	T	15	2	T	22	2	T
29..	14	14	T	15	3	T	21	2	T
30..	14	16	T	18	2	T	21	2	T
31..	14	9	T	--	--	--	20	2	T
Total	291.7	--	10	526	--	8	1041	--	7
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..	20	2	T	260	12	8	518	12	17
2..	20	2	T	250	7	5	675	24	49
3..	25	2	T	240	--	4	3070	138	1250
4..	30	2	T	230	E	4	5580	320	4820
5..	50	2	T	230	E	4	8990	459	11100
6..	80	3	1	555	--	40	10300	270	7510
7..	206	11	6	2330	167	1050	5380	245	3560
8..	510	32	44	2160	215	1250	4800	262	3400
9..	1110	98	294	1740	173	813	9100	350	8600
10..	1600	126	544	1260	121	412	11300	234	7140
11..	1780	103	495	960	54	140	11600	179	5610
12..	1680	100	454	775	33	69	9410	115	2920
13..	1000	96	259	655	28	50	5260	84	1190
14..	570	--	E 85	1040	35	98	2610	89	627
15..	401	26	28	1700	78	S 397	2820	97	738
16..	300	14	11	3120	207	1740	4060	166	1820
17..	250	8	5	3910	286	3020	3750	154	1560
18..	210	5	3	3420	284	2620	2780	103	773
19..	200	12	6	2590	142	993	1860	70	352
20..	365	28	28	1900	86	441	1480	52	208
21..	925	31	77	1640	68	301	1750	46	217
22..	1500	79	320	1460	58	229	2510	47	318
23..	1480	77	308	1240	46	154	2500	48	324
24..	1000	94	254	1040	32	90	2020	46	251
25..	800	83	179	880	27	64	1640	31	137
26..	700	45	85	755	21	43	1420	26	100
27..	520	35	49	660	12	21	1230	22	73
28..	450	25	30	586	14	22	1040	19	53
29..	370	15	15	542	12	18	885	15	36
30..	320	12	10	--	--	--	785	12	25
31..	280	13	10	--	--	--	710	8	15
Total	18752	--	3601	38128	--	14100	121833	--	64793

E Estimated.

S Computed by subdividing day.

T Less than 0.50 ton.

## LICKING RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..	646	7	12	1600	36	156	102	7	2
2..	598	7	11	1470	28	111	104	9	2
3..	562	7	11	1240	22	74	102	12	3
4..	530	9	13	1020	15	41	102	7	2
5..	486	10	13	835	11	25	102	5	1
6..	494	10	13	670	8	14	95	7	2
7..	494	10	13	554	7	10	84	10	2
8..	510	11	15	470	6	8	71	7	1
9..	760	23	47	401	7	8	63	12	2
10..	1050	30	85	347	7	6	57	13	2
11..	910	51	125	311	2	2	55	12	2
12..	770	31	64	281	6	4	49	17	2
13..	670	18	32	263	12	8	47	15	2
14..	650	15	26	263	10	7	47	16	2
15..	646	15	26	269	4	3	52	12	2
16..	614	10	16	245	4	3	61	11	2
17..	558	7	10	212	4	2	71	14	3
18..	698	10	22	182	2	1	65	15	3
19..	5130	153	2370	157	2	1	67	12	2
20..	7410	547	10900	137	3	1	90	12	3
21..	7360	310	6160	122	4	1	108	11	3
22..	4850	162	2120	111	4	1	95	11	3
23..	2960	104	831	102	4	1	75	10	2
24..	1860	70	352	90	4	1	63	13	2
25..	1460	40	158	95	5	1	55	12	2
26..	1180	24	76	95	5	1	47	8	1
27..	1100	16	48	93	5	1	44	7	1
28..	1250	20	68	84	5	1	39	12	1
29..	1260	22	75	77	5	1	36	13	1
30..	1600	38	164	82	5	1	32	12	1
31..	--	--	--	95	6	2	--	--	--
Total	49066	--	23876	11973	--	497	2080	--	59
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..	28	15	1	93	13	3	30	56	4
2..	26	12	1	61	17	3	28	46	3
3..	27	10	1	45	30	4	26	46	3
4..	33	9	1	42	28	3	23	71	4
5..	33	12	1	112	32	11	21	91	5
6..	41	17	2	170	26	12	16	44	2
7..	41	17	2	245	23	15	15	32	1
8..	45	37	4	167	27	12	14	30	1
9..	50	19	2	97	36	9	12	53	2
10..	82	11	2	71	44	8	9.9	32	1
11..	82	14	3	63	27	4	9.9	43	1
12..	93	15	4	109	84	34	8.8	34	1
13..	79	12	2	638	299	515	5.5	22	T
14..	284	20	15	386	107	112	4.4	21	T
15..	359	26	25	263	161	114	4.4	16	T
16..	266	37	26	173	242	113	4.4	16	T
17..	154	28	12	127	234	80	4.4	11	T
18..	102	32	9	93	147	37	5.5	11	T
19..	79	38	8	79	141	30	7.7	15	T
20..	152	26	11	65	156	27	8.8	11	T
21..	102	22	6	55	156	23	8.8	15	T
22..	61	36	6	59	129	20	8.8	14	T
23..	65	37	6	102	89	24	9.9	11	T
24..	71	27	5	194	92	48	12	16	1
25..	71	47	9	104	74	21	11	9	T
26..	63	33	6	69	70	13	12	12	T
27..	55	30	4	52	40	6	15	33	1
28..	49	28	4	44	36	4	28	27	2
29..	41	19	2	38	52	5	44	20	2
30..	38	28	3	36	63	6	364	57	78
31..	52	32	4	33	74	6	--	--	--
Total	2724	--	187	3885	--	1322	772.2	--	115

Total discharge for year (cfs-days)..... 251071.9  
 Total load for year (tons)..... 108575

S Computed by subdividing day.

T Less than 0.50 ton.

## LICKING RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1963 to September 1964

(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)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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. 6, 1964.....	1015			10900	342		42	59	75	85	90	93	100				SBWC	
Mar. 6, 1964.....	1015			10900	342		45	57	77	89	92	93	100				SBN	
Mar. 20.....	0645			3600	555		50	60	74	86	97	99	100				SBWC	
Aug. 13.....	0710			606	376		79	88	96	97	99	100	--				SBWC	

## LICKING RIVER BASIN--Continued

3-2515. LICKING RIVER AT MCKINNEYSBURG, KY.

LOCATION.--At gaging station (on right bank) 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 1964.

Water temperatures: October 1952 to September 1964.

Sediment records: October 1952 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 423 micromhos Jan. 8; minimum daily, 106 micromhos Mar. 13.

Water temperatures: Maximum, 90°F July 3; minimum, freezing point on many days during December to March.

Sediment concentrations: Maximum daily, 1,950 ppm Mar. 5; minimum daily, 100 ppm Nov. 26, on many days during October to January.

Specific conductance: Maximum daily, 217,000 to 220,000 micromhos Mar. 5; minimum daily, 83 micromhos Mar. 4, 1963.

EXTREMES 1952-54.--Specific conductance: Maximum daily, 574 micromhos Nov. 20, 1961; minimum daily, 83 micromhos Mar. 4, 1963.

Water temperatures: Maximum, 90°F July 3, 1964; minimum, freezing point on many days during winter months.

Sediment concentrations: Maximum daily, 4,230 ppm Feb. 25, 1956; minimum daily, 1 ppm on many days during 1952-56, 1963.

Sediment loads: Maximum daily, 223,000 tons Feb. 25, 1956; minimum daily, less than 0.50 ton on many days during 1952-56, 1961, 1963-64.

REMARKS.--Values reported for iron are in solution and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, (3) maximum daily turbidity for each month, and (4) composite of all daily samples for each month. Flow affected by ice Dec. 19 to Jan. 2.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color	Turbidity
														Calcium	Non-magnesium				
Oct. 2, 1963.....	36	6.1	0.00					90	18	14			146	90	16	217	6.9	6	--
Oct. 23.....	10	7.2	.01					140	20	12			174	130	16	287	7.0	7	--
Oct. 29.....	18.4	--	--					--	--	--			151	--	--	--	--	--	20
Oct. 1-31.....								--	--	--						258	--	--	--
Nov. 4.....	--	--	--					--	--	--						--	--	--	6
Nov. 14.....	22	5.0	.01					138	17	9.0			158	124	11	273	6.7	5	--
Nov. 20.....	28	3.0	.00					142	16	13			170	130	14	283	6.7	5	--
Nov. 1-30.....	19.6	--	--					--	--	--			186	--	--	285	--	--	--
Dec. 8.....	96	5.6	.04					131	17	15			162	123	16	282	7.2	10	90
Dec. 24.....	48	5.6	.01					108	13	56			180	122	34	371	6.7	5	--
Dec. 1-17, 23-31.....	60.5	--	--					--	--	--			164	--	--	316	--	--	--
Jan. 8, 1964.....	2640	5.0	.05					77	28	71			236	124	61	423	6.1	25	--
Jan. 20.....	--	--	--					--	--	--			--	--	--	--	--	--	260
Jan. 30.....	804	7.4	.03					64	25	16			137	53	30	259	6.3	15	--
Jan. 1-31.....	1562	--	--					--	--	--			--	--	--	239	--	--	--
Feb. 8.....	6120	6.5	.04					110	29	8.0			158	120	30	269	6.8	10	550
Feb. 21.....	4300	7.2	.09					64	24	6.5			107	73	20	171	6.8	22	--
Feb. 1-29.....	3156	--	--					--	--	--			133	--	--	209	--	--	--

LICKING RIVER BASIN--Continued  
 3-2515. LICKING RIVER AT MCKINNEYSBURG, KY.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color	Turbidity
														Calcium	Non-carbonate				
Mar. 3, 1964.....	3220	8.0	0.10					90	28	12			148	107	33	234	8.1	22	--
Mar. 13.....	24700	7.4	.10					39	14	7.5			78	49	17	106	7.7	38	1300
Mar. 1-3, 5-31.....	15870	--	--					--	--	--			112	--	--	174	--	--	--
Apr. 15.....	1180	9.6	.01					78	26	20			153	90	26	244	7.9	10	--
Apr. 20.....	--	--	--					--	--	--			--	--	--	--	--	--	--
Apr. 23.....	11400	9.8	.02					52	18	4.0			93	57	14	134	7.6	20	1400
Apr. 1-30.....	3441	--	--					--	--	--			137	--	--	209	--	--	--
May 1.....	--	--	--					--	--	--			--	--	--	--	--	--	150
May 31.....	2370	8.7	.05					82	23	6.0			122	91	24	197	7.8	5	--
May 1-31.....	173	7.9	.01					94	20	16			132	97	20	240	8.0	5	--
June 1.....	897	--	--					--	--	--			132	--	--	223	--	--	--
June 17.....	101	8.0	.04					99	19	26			172	107	26	282	7.2	5	--
June 19.....	--	--	--					--	--	--			--	--	--	--	--	700	--
June 20.....	185	5.2	.01					92	24	8.0			134	102	26	229	7.5	10	--
June 1-30.....	174	--	--					--	--	--			142	--	--	263	--	--	--
July 10.....	--	--	--					--	--	--			--	--	--	--	--	--	800
July 20.....	227	7.0	.00					82	16	27			134	88	21	254	7.7	5	--
July 30.....	101	7.4	.04					84	14	73			228	113	44	411	7.7	5	--
July 1-31.....	140	--	--					--	--	--			173	--	--	318	--	--	--
Aug. 15.....	--	--	--					--	--	--			--	--	--	--	--	--	130
Aug. 28.....	168	5.5	.00					68	37	78			242	108	52	415	7.4	5	--
Aug. 30.....	93	5.8	.01					79	13	22			140	84	20	216	7.8	5	--
Aug. 1-31.....	189	--	--					--	--	--			172	--	--	299	--	--	--
Sept. 1.....	64	5.5	.01					84	16	12			120	86	17	211	7.7	5	--
Sept. 10.....	22	3.8	.01					82	18	47			201	106	39	332	7.6	5	--
Sept. 23.....	--	--	--					--	--	--			--	--	--	--	--	--	130
Sept. 1-30.....	36.4	--	--					--	--	--			158	--	--	285	--	--	--

LICKING RIVER BASIN--Continued  
3-2515. LICKING RIVER AT MCKINNEYSBURG, KY.--Continued

Temperature (°F) of water, water year October 1963 to September 1964

Temperature (° F ) by Month, Year, and Day																															Precipitation (inches) by Month, Year, and Day																														
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	63	61	65	65	60	59	61	59	59	58	62	59	57	58	57	58	57	55	57	59	60	58	--	59	60	61	60	59	54	52	59																													
November.....	52	48	45	46	--	53	49	51	50	52	46	44	42	44	46	48	49	45	44	48	49	48	45	42	45	--	45	43	39	--	47																														
December.....	38	36	37	--	34	36	36	37	34	32	32	34	33	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	32	32	32	32	32	32	32	32	32																													
February.....	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	32	--	--	32																													
March.....	32	34	36	--	39	38	38	39	40	--	45	38	39	41	42	39	40	39	39	--	38	38	37	38	40	39	39	40	38	38	39	39																													
April.....	39	39	41	40	41	44	47	61	--	45	47	48	49	51	51	53	56	55	56	57	54	54	53	54	55	54	53	57	54	53	--	50																													
May.....	58	55	54	58	61	62	62	63	64	64	66	64	63	63	59	60	64	67	65	66	67	68	70	69	68	--	69	67	64	66	64																														
June.....	65	64	63	68	69	70	72	74	73	77	80	79	80	--	78	77	78	81	82	82	83	82	82	82	79	81	79	81	84	82	--	76																													
July.....	89	88	90	80	77	81	76	73	75	--	76	77	74	72	74	77	80	81	80	83	82	82	84	83	83	85	--	84	84	85	80	81																													
August.....	82	86	83	84	87	82	83	82	80	78	76	74	68	64	63	61	67	67	68	70	73	72	74	73	74	72	72	74	75	76	74	74																													
September.....	72	69	68	72	70	71	70	69	69	70	70	67	62	58	57	59	62	60	69	61	--	65	62	59	63	55	59	57	58	54	--	64																													



## LICKING RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964

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..	38	20	2	12	9	T	35	2	T
2..	36	16	2	12	6	T	36	2	T
3..	32	19	2	14	6	T	36	2	T
4..	29	20	2	12	8	T	40	2	T
5..	30	19	2	12	9	T	46	2	T
6..	29	18	1	14	10	T	62	2	T
7..	28	20	2	14	9	T	69	3	1
8..	24	18	1	14	8	T	96	4	1
9..	22	16	1	14	7	T	105	2	1
10..	22	15	1	14	6	T	95	2	1
11..	18	15	1	13	5	T	88	2	T
12..	14	13	T	15	4	T	85	2	T
13..	13	16	1	22	6	T	84	3	1
14..	14	12	T	22	2	T	79	4	1
15..	17	13	1	20	3	T	76	6	1
16..	17	19	1	18	8	T	74	5	1
17..	17	12	1	16	6	T	71	3	1
18..	15	10	T	14	5	T	69	3	1
19..	13	9	T	16	5	T	66	2	T
20..	12	7	T	17	4	T	60	2	T
21..	12	8	T	17	3	T	55	2	T
22..	10	11	T	19	9	T	53	2	T
23..	10	20	1	27	10	1	51	3	T
24..	12	17	1	35	9	1	48	3	T
25..	13	15	1	32	2	T	46	2	T
26..	13	13	T	30	1	T	45	6	1
27..	12	12	T	30	3	T	43	4	T
28..	12	12	T	28	2	T	42	6	1
29..	12	14	T	32	2	T	41	5	1
30..	12	10	T	34	2	T	40	4	T
31..	12	10	T	--	--	--	40	2	T
Total	570	--	28	587	--	9	1876	--	19
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..	40	2	T	600	18	29	1100	11	33
2..	45	2	T	500	15	20	1110	23	69
3..	55	8	1	491	14	18	3220	259	S 2500
4..	82	41	9	496	12	16	17600	--	E 88000
5..	499	57	77	491	12	16	41300	1950	217000
6..	1070	77	222	2200	--	E 1900	40800	966	106000
7..	2590	156	1090	4720	370	4720	32900	553	49100
8..	2640	138	984	6120	515	8510	25200	455	S 33900
9..	2630	--	E 800	5250	342	4850	38000	1180	121000
10..	4280	246	2840	3450	222	2070	57400	--	E 210000
11..	2500	132	891	2490	136	914	49100	498	66300
12..	1400	77	291	1870	92	464	35300	196	18700
13..	1000	43	116	1570	80	339	24700	148	9870
14..	800	38	82	1950	68	358	19800	149	7960
15..	600	32	52	3580	94	909	18600	298	15000
16..	500	26	35	6910	186	3470	12700	226	7750
17..	400	22	24	8060	290	6310	9040	194	4740
18..	350	19	18	8090	289	6310	6910	148	2760
19..	300	26	22	7000	204	3860	5570	113	1700
20..	2340	211	S 1580	5710	158	2440	4200	56	635
21..	4210	179	2030	4300	122	1420	6080	496	8140
22..	3990	194	2090	3350	76	687	5710	210	3240
23..	3260	203	1790	2700	51	372	6430	142	2460
24..	2940	152	1210	2280	40	246	5510	137	2040
25..	2850	114	877	1860	32	161	4470	72	869
26..	1960	80	423	1620	26	114	7600	250	A 5000
27..	1560	69	291	1420	18	69	4230	195	2230
28..	1240	60	201	1280	14	48	3140	122	1030
29..	1040	50	140	1180	10	32	2410	73	475
30..	804	34	74	--	--	--	1990	46	247
31..	655	27	48	--	--	--	1700	32	147
Total	48430	--	18308	91538	--	50672	493820	--	988895

E Estimated.

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed from partly estimated-concentration graph.

## LICKING RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..	1520	32	131	4040	97	1060	164	16	7
2..	1360	27	99	3660	74	731	159	17	7
3..	1270	25	86	2950	72	573	175	17	8
4..	1160	20	63	2370	56	358	218	17	10
5..	1070	17	49	1920	35	181	221	16	10
6..	1050	16	45	1590	22	94	200	14	8
7..	1040	17	48	1330	15	54	192	18	9
8..	1020	18	50	1150	12	37	188	18	9
9..	1110	18	54	1010	7	191	180	17	8
10..	1310	20	71	860	8	18	164	16	7
11..	1380	22	82	744	8	16	115	15	5
12..	1420	22	84	645	8	14	115	16	5
13..	1360	20	73	585	8	13	122	16	5
14..	1400	20	76	535	7	10	178	17	8
15..	1180	22	70	482	9	12	180	20	10
16..	1140	23	71	442	10	12	122	22	7
17..	1080	18	52	414	10	11	101	24	6
18..	1050	28	79	390	10	10	214	--	120
19..	4210	849	10900	338	14	13	212	310	180
20..	10600	1420	40600	295	11	9	185	276	138
21..	12700	560	19200	257	12	8	182	88	43
22..	12900	362	12600	230	11	7	195	56	29
23..	11400	230	7080	209	11	6	227	56	34
24..	7670	153	3170	195	14	7	316	55	47
25..	4390	105	1240	185	12	6	250	56	38
26..	2940	85	675	178	12	6	200	48	26
27..	2480	64	428	164	14	6	150	47	19
28..	3460	85	794	152	13	5	120	42	14
29..	4100	134	1480	157	13	6	100	37	10
30..	4470	136	1640	161	12	5	87	48	11
31..	--	--	--	173	16	7	--	--	--
Total	103240	--	101090	27811	--	3486	5232	--	838
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..	77	48	10	154	49	20	64	48	8
2..	70	47	9	117	43	14	58	44	7
3..	67	52	9	90	42	10	45	43	5
4..	64	49	8	75	37	7	38	39	4
5..	61	42	7	92	34	8	34	45	4
6..	60	26	4	103	32	9	30	45	4
7..	65	42	7	84	33	7	28	31	2
8..	101	69	19	72	32	6	27	32	2
9..	118	--	30	84	42	10	24	37	2
10..	200	233	126	218	45	26	22	39	2
11..	144	136	53	212	45	26	20	33	2
12..	117	80	25	170	43	20	18	30	1
13..	122	67	22	144	42	16	17	27	1
14..	129	65	23	481	140	180	17	22	1
15..	134	56	20	760	112	230	16	27	1
16..	134	46	17	590	56	89	15	27	1
17..	239	34	25	374	48	48	14	26	1
18..	320	54	47	257	46	32	13	26	1
19..	270	41	30	185	47	23	13	27	1
20..	198	40	21	146	49	19	13	29	1
21..	173	39	18	117	47	15	13	31	1
22..	170	41	19	105	49	14	13	32	1
23..	248	41	27	105	48	14	13	28	1
24..	227	43	26	88	41	10	12	31	1
25..	157	40	17	95	43	13	12	27	1
26..	118	37	12	274	88	65	11	26	1
27..	103	40	11	277	51	38	10	27	1
28..	100	38	10	168	44	20	21	30	2
29..	98	37	10	118	44	14	90	25	6
30..	101	36	10	93	39	10	370	29	29
31..	145	37	14	71	44	8	--	--	--
Total	4330	--	686	5869	--	1021	1091	--	95
Total discharge for year (cfs-days).....									784394
Total load for year (tons).....									1165147

E Estimated.

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

## LICKING RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1963 to September 1964  
 (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)	Water tem- per- ature (° F)	Sam- pling point	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	
Feb. 7, 1964.....	1110			4750	319	63	69	83	91	98	98	100					SBWC
Feb. 7.....	1110			4750	319	10	28	54	78	95	96	100					SEN
Mar. 5.....	1730			42700	1680	57	68	83	91	99	100	---					SBWC

## LICKING RIVER BASIN--Continued

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

LOCATION.--At gaging station at bridge on State Highways 256 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 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 83°F Aug. 3, 4; minimum, freezing point on many days during December and January.

EXTREMES, 1949-64.--Water temperatures: Maximum, 87°F June 30, 1952, July 14, 1954; minimum, freezing point on many days during December and January.

REMARKS.--Stream frozen Dec. 15 to Jan. 7, Jan. 14-20. Small diversion by Cynthiana municipal waterplant.

Temperature (°F) of water, water year October 1963 to September 1964 (Twice-daily measurements at approximately 0700 and 1800)																																	
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																																	
0700.....	62	63	64	67	67	66	67	69	69	68	68	69	68	67	66	67	67	68	69	68	67	67	68	68	69	69	69	69	68	65	60	59	67
1800.....	64	65	68	69	68	69	70	71	70	69	71	70	68	68	68	69	70	69	69	70	69	69	70	69	70	71	70	68	64	61	61	68	
November																																	
0700.....	60	56	51	47	47	48	47	46	45	46	45	44	43	42	43	45	47	46	46	48	49	47	44	45	46	45	45	45	42	40	--	46	
1800.....	60	57	50	48	46	48	47	48	48	46	45	43	43	44	45	47	48	47	48	50	49	46	45	46	47	45	46	43	41	--	47		
December																																	
0700.....	39	40	38	38	40	41	42	42	40	39	40	41	40	38	37	32	32	32	32	32	34	35	35	36	36	36	35	35	35	37	34	34	
1800.....	40	40	39	40	42	43	44	41	40	40	41	41	39	38	32	32	32	32	32	34	35	36	37	37	37	36	35	37	38	38	34	36	
January																																	
0700.....	32	32	32	32	32	32	32	34	35	35	34	34	34	32	32	32	32	32	32	34	35	35	36	36	36	36	35	35	35	37	34	34	
1800.....	32	32	32	32	32	32	32	35	35	34	34	34	34	32	32	32	32	32	34	35	36	37	37	37	37	36	37	37	38	38	34	36	
February																																	
0700.....	38	37	37	36	37	39	38	35	35	35	34	34	34	35	35	36	36	37	36	35	35	35	36	36	36	37	37	36	37	37	37	36	
1800.....	37	39	38	38	39	39	36	36	36	35	35	34	35	36	37	37	37	37	36	36	35	36	37	37	38	37	38	38	39	--	37	37	
March																																	
0700.....	39	40	40	42	42	41	42	43	43	41	40	40	40	42	43	44	43	43	43	41	41	44	46	46	41	42	42	41	41	41	42	43	
1800.....	40	41	42	42	42	42	44	43	42	41	40	41	43	43	44	45	43	44	41	42	44	47	49	44	43	43	41	42	41	42	42	43	
April																																	
0700.....	41	43	47	44	45	48	51	53	53	52	54	57	58	61	62	63	65	65	66	65	64	65	62	62	63	65	63	63	64	62	--	58	
1800.....	43	48	45	45	48	51	54	54	55	57	58	61	63	64	65	66	66	65	67	64	63	64	65	64	65	63	64	64	62	--	59		
May																																	
0700.....	60	63	63	65	71	70	72	71	72	71	71	70	71	69	70	70	72	74	75	74	75	76	77	77	77	76	75	76	73	71	71	71	
1800.....	63	63	66	72	73	72	72	72	72	72	72	72	70	70	71	72	73	74	76	76	77	77	77	77	77	77	77	76	72	72	71	73	
June																																	
0700.....	70	70	71	70	72	72	74	74	76	77	77	77	77	76	77	76	75	78	81	80	81	80	81	80	78	77	80	79	80	--	--	76	
1800.....	71	72	71	72	73	74	76	77	78	78	78	78	77	77	77	76	75	78	82	81	82	81	80	79	80	81	80	81	80	--	--	77	
July																																	
0700.....	79	80	80	78	78	77	76	76	76	75	77	77	76	77	78	79	80	80	80	79	80	79	80	79	79	79	80	80	80	78	78	78	
1800.....	80	80	80	79	78	77	77	77	77	77	78	78	78	79	80	81	81	80	80	80	80	80	79	80	80	81	81	80	79	79	79		
August																																	
0700.....	79	81	82	82	81	80	81	82	80	80	81	80	78	76	74	74	75	76	75	73	75	75	73	72	72	72	74	76	77	79	80	77	
1800.....	81	82	83	82	81	82	82	81	82	82	82	79	76	75	75	76	77	75	76	75	76	75	74	73	74	76	77	79	80	81	78	78	
September																																	
0700.....	79	77	77	76	77	79	79	80	79	80	81	77	76	75	75	75	76	74	73	71	70	72	72	69	66	66	65	65	62	62	--	74	
1800.....	80	78	78	79	80	81	81	81	81	81	80	77	77	77	76	76	76	74	73	72	73	72	73	72	73	72	68	67	66	64	64	--	

## GREAT MIAMI RIVER BASIN

3-2650. STILLWATER RIVER AT PLEASANT HILL, OHIO

LOCATION.--At gaging station at highway bridge, 0.8 mile northwest of Pleasant Hill, Miami County, and 2 miles downstream from Painter Creek.

DRAINAGE AREA.--503 square miles.

RECORDS AVAILABLE.--Sediment records: October 1963 to September 1964.

EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 669 ppm Mar. 9; minimum daily, 3 ppm on many days in December to February.

Sediment loads: Maximum daily, 21,400 tons Apr. 21; minimum daily, 0.1 ton on many days in December and January.

REMARKS.--Diurnal fluctuation of flow is caused by mills above station.

Suspended sediment, water year October 1963 to September 1964

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..	14	29	1.1	20	12	0.6	19	7	0.4
2..	12	29	.9	27	11	.8	20	7	.4
3..	13	26	.9	25	10	.7	16	7	.3
4..	14	25	.9	23	10	.6	18	7	.3
5..	13	25	.9	22	9	.5	18	7	.3
6..	14	25	.9	20	9	.5	17	7	.3
7..	11	21	.6	21	10	.6	18	6	.3
8..	9.8	17	.4	21	10	.6	20	5	.3
9..	10	18	.5	18	10	.5	21	4	.2
10..	10	19	.5	17	10	.4	19	3	.2
11..	9.5	20	.5	18	11	.5	20	3	.2
12..	11	21	.6	20	11	.6	20	3	.2
13..	10	22	.6	17	11	.5	20	3	.2
14..	10	23	.6	16	11	.5	17	3	.1
15..	10	24	.6	17	10	.4	15	3	.1
16..	10	24	.6	16	10	.4	15	3	.1
17..	10	24	.6	16	10	.4	12	3	.1
18..	10	24	.6	18	10	.5	13	3	.1
19..	9.5	24	.6	17	10	.4	12	3	.1
20..	10	23	.6	18	10	.5	9.8	3	.1
21..	10	22	.6	19	9	.5	10	3	.1
22..	11	22	.6	19	9	.5	11	3	.1
23..	12	19	.6	21	8	.4	11	3	.1
24..	13	17	.6	21	7	.4	11	3	.1
25..	13	16	.6	19	7	.4	12	3	.1
26..	13	15	.5	19	5	.2	15	3	.1
27..	12	15	.5	19	5	.2	15	3	.1
28..	13	15	.5	18	6	.3	21	3	.2
29..	15	14	.6	18	9	.4	19	3	.2
30..	14	13	.5	18	8	.4	16	3	.1
31..	15	12	.5	--	--	--	16	3	.1
Total	361.8	--	19.6	578	--	14.2	496.8	--	5.6

## GREAT MIAMI RIVER BASIN--Continued

3-2650. STILLWATER RIVER AT PLEASANT HILL, OHIO--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

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..	15	3	0.1	51	4	0.6	47	5	0.6
2..	16	3	.1	47	4	.5	125	8	2.7
3..	17	3	.1	44	3	.4	219	15	8.9
4..	18	3	.1	37	3	.3	445	68	159
5..	19	3	.2	35	3	.3	3210	519	4500
6..	20	3	.2	51	3	.4	1220	144	508
7..	24	3	.2	67	3	.5	447	96	116
8..	24	3	.2	62	3	.5	288	76	59
9..	27	3	.2	58	3	.5	4250	669	9430
10..	28	3	.2	50	3	.4	10000	486	13100
11..	27	3	.2	38	3	.3	7460	190	4120
12..	26	3	.2	42	3	.3	3780	106	1080
13..	25	3	.2	46	3	.4	2720	75	551
14..	23	3	.2	44	3	.4	2030	90	490
15..	19	3	.2	37	3	.3	2280	170	1000
16..	21	3	.2	44	3	.4	1330	60	215
17..	23	3	.2	38	3	.3	875	32	76
18..	25	3	.2	47	4	.5	585	28	44
19..	36	3	.3	46	5	.6	445	33	40
20..	55	3	.4	46	5	.6	396	26	28
21..	77	3	.6	42	5	.6	495	35	45
22..	75	3	.6	39	5	.5	641	55	95
23..	67	3	.5	33	5	.4	492	25	35
24..	66	3	.5	38	5	.5	411	13	14
25..	103	3	.8	34	5	.4	369	14	14
26..	133	4	1.4	42	5	.6	478	28	36
27..	83	5	1.1	40	5	.5	420	30	34
28..	65	5	.9	41	5	.6	338	21	19
29..	55	5	.7	38	5	.5	302	12	9.8
30..	56	5	--	--	--	--	267	10	7.2
31..	51	5	.7	--	--	--	247	8	5.3
Total	1319	--	12.5	1277	--	13.1	46612	--	35842.5
	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..	230	7	4.3	674	21	38	90	28	6.8
2..	1060	89	S 437	533	20	29	91	28	6.9
3..	4840	364	4760	444	20	24	91	27	6.6
4..	3920	208	S 2360	375	20	20	87	26	6.1
5..	1640	87	385	326	20	18	84	25	5.7
6..	2400	113	S 846	288	21	16	89	25	6.0
7..	2760	135	1010	261	23	16	95	25	6.4
8..	1350	58	211	243	23	15	182	--	E 110
9..	819	32	71	226	23	14	304	--	E 170
10..	582	23	36	204	23	13	164	60	26
11..	458	14	17	186	22	11	115	28	8.7
12..	388	13	14	219	40	B 25	97	12	3.1
13..	351	13	12	217	40	B 25	172	--	E 13
14..	308	13	11	192	40	B 20	266	--	E 45
15..	261	13	9.2	170	37	17	166	35	A 16
16..	233	15	9.4	157	36	15	176	33	16
17..	222	16	9.6	154	36	15	139	31	12
18..	218	17	10	148	36	14	110	29	8.6
19..	1160	86	S 383	138	36	13	102	27	7.4
20..	6530	497	S 11400	127	36	12	107	27	7.8
21..	13200	600	21400	120	36	12	128	--	E 11
22..	9640	280	7290	116	36	11	281	--	E 50
23..	5850	162	2560	112	35	10	187	--	E 20
24..	2610	98	691	106	33	9.4	128	25	B 9
25..	1580	68	290	107	32	9.2	102	20	B 6
26..	1110	46	138	109	31	9.1	86	19	4.4
27..	1060	49	140	134	30	11	78	19	4.0
28..	1870	85	429	115	30	9.3	72	18	3.5
29..	1290	56	195	103	30	8.3	67	18	3.2
30..	900	32	78	96	30	7.8	63	18	3.1
31..	--	--	--	92	29	7.2	--	--	--
Total	6884.0	--	55206.5	6492	--	474.3	3919	--	602.3

E Estimated.

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

## GREAT MIAMI RIVER BASIN--Continued

## 3-2650. STILLWATER RIVER AT PLEASANT HILL, OHIO--Continued

## Suspended sediment, water year October 1963 to September 1964--Continued

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..	69	18	3.4	32	38	3.3	21	16	0.9
2..	63	18	3.1	32	37	3.2	20	15	.8
3..	62	18	3.0	32	36	3.1	19	13	.7
4..	63	18	3.1	58	--	10	18	12	.6
5..	60	18	2.9	35	35	3.3	17	11	.5
6..	55	18	2.7	30	30	2.4	17	10	.4
7..	63	25	B	37	28	2.8	17	10	.4
8..	89	35	B	28	27	2.0	15	10	.4
9..	86	25	B	25	25	1.7	14	10	.4
10..	70	20	3.8	26	23	1.6	14	14	.5
11..	62	20	3.3	25	22	1.5	13	22	.8
12..	60	20	3.2	26	21	1.5	10	22	.6
13..	60	21	3.4	26	20	1.4	9.6	20	.5
14..	57	22	3.4	24	19	1.2	9.4	20	.5
15..	55	22	3.3	25	18	1.2	10	19	.5
16..	53	23	3.3	24	18	1.2	13	18	.6
17..	52	23	3.2	22	19	1.1	15	18	.7
18..	48	23	3.0	21	19	1.1	17	26	1.2
19..	48	23	3.0	20	18	1.0	18	--	E 2
20..	44	23	2.7	20	18	1.0	21	--	E 3
21..	49	--	E 3	21	20	1.1	24	--	E 3
22..	86	--	E 10	28	24	1.8	27	35	B 3
23..	78	--	E 10	26	24	1.7	22	25	B 1
24..	62	--	E 8	29	23	1.8	19	17	B .9
25..	72	--	E 9	27	22	1.6	16	11	.5
26..	49	45	B 6	24	20	1.3	17	10	.4
27..	55	45	B 6	23	19	1.2	19	10	.5
28..	51	45	B 6	22	18	1.1	19	10	.5
29..	42	40	B 4	23	18	1.1	18	11	.5
30..	37	40	B 4	23	18	1.1	17	12	.6
31..	33	40	3.6	22	17	1.0	--	--	--
Total	1833	--	141.4	836	--	60.4	506.0	--	26.9
Total discharge for year (cfs-days).....									133070.6
Total load for year (tons).....									92419.3

E Estimated.

B Computed from estimated-concentration graph.

## GREAT MIAMI RIVER BASIN--Continued

## 3-2650. STILLWATER RIVER AT PLEASANT HILL, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964  
(Methods of analysis: B, bottom-sediment 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)	Samp- ling point	Water tem- per- ature (°F)	Discharge (cfs)	Sediment con- cen- tration (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. 5, 1964.....	0730			3560	721		55	66	77	88	96	98	100	--	--	--	--	SBWC		
Mar. 9.....	1600			5660	1080		73	84	89	93	97	98	99	100	--	--	--	SBWC		
Mar. 9.....	1600			5660	1080		36	53	80	89	94	95	98	100	--	--	--	SBW		
Apr. 3.....	1630			5620	412		74	76	91	93	96	97	98	100	--	--	--	SBWC		
Apr. 21.....	1335			14700	538		78	84	91	94	96	97	98	98	100	--	--	SBWC		
Apr. 21.....	1335			14700	538		55	71	88	94	95	96	97	98	100	--	--	SBW		



GREAT MIAMI RIVER BASIN--Continued  
3-2715. GREAT MIAMI RIVER AT MIAMISBURG, OHIO

LOCATION.--Temperature recorder at gaging station on left bank, 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 1964.  
MAXIMUM, 1959-64.--water temperatures: Maximum, 81°F, July 27-28, 1963; 4, 5, minimum, 37°F Jan. 14.  
EXTREMES, 1959-64.--water temperatures: Maximum, 91°F July 27, 28, 1963, July 24-26, Aug. 4, 5, 1964; minimum freezing point Jan. 10, 11, 15-17, 1962.

Temperature (°F) of water, water year October 1963 to September 1964 (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	73	74	76	76	76	76	76	76	76	76	75	75	72	72	72	73	74	73	74	73	72	73	74	75	75	75	75	75	75	69	65	65	74	
Maximum	69	70	73	72	72	72	72	72	72	72	72	72	69	67	68	70	70	70	70	70	70	70	69	71	71	73	72	73	69	65	63	64	70	
Minimum	66	67	70	69	69	69	69	69	69	69	69	69	66	64	65	67	68	68	68	68	68	68	68	69	70	70	70	70	70	64	60	57	--	
November	64	63	61	60	59	63	63	65	63	63	62	60	59	57	58	60	61	60	63	64	65	65	61	59	59	60	60	60	60	60	57	--	61	
Maximum	60	58	58	58	58	59	62	63	61	62	60	58	57	57	57	58	59	60	59	60	63	64	61	59	57	58	58	59	57	54	--	59	--	
Minimum	54	52	53	54	54	53	54	52	48	48	48	48	47	45	43	43	44	43	41	42	44	45	45	45	45	45	45	44	44	42	47	--	46	
Maximum	52	52	53	53	53	52	53	52	48	47	47	48	47	45	43	40	40	43	41	39	40	42	44	42	42	43	45	44	44	41	41	46	--	
Minimum	42	44	46	47	47	47	48	48	47	44	44	44	39	39	45	46	47	48	51	51	48	50	50	50	50	45	42	44	45	48	50	46	--	
Maximum	40	41	44	46	46	46	47	48	47	44	44	43	38	37	39	45	46	47	48	46	47	49	49	45	42	41	41	42	45	48	44	44	--	
Minimum	51	51	50	50	53	53	53	48	47	46	47	48	48	50	50	50	47	50	51	50	50	50	49	51	53	53	53	53	53	50	--	50	--	
Maximum	50	50	49	47	50	50	48	46	45	45	44	46	48	48	49	47	45	46	50	50	49	49	48	47	47	51	50	52	50	--	--	48	--	
Minimum	54	55	60	60	51	44	45	46	50	46	41	41	42	44	46	47	48	46	46	46	46	46	46	48	52	54	55	50	49	48	45	48	--	
Maximum	52	54	55	51	44	43	43	45	46	41	40	40	40	42	44	46	47	46	46	46	45	46	48	52	50	48	48	45	44	44	46	46	--	
Minimum	47	49	50	45	44	49	52	52	50	52	53	54	57	58	60	61	63	66	64	59	58	60	60	61	61	61	60	60	61	61	--	56	--	
Maximum	45	47	45	44	44	44	49	50	48	50	52	53	57	58	60	61	63	59	58	60	60	60	60	60	60	60	59	58	60	59	--	54	--	
Minimum	61	63	65	68	69	71	71	70	71	71	71	70	70	68	70	70	72	75	78	79	78	79	78	78	80	80	78	75	71	72	70	72	70	
Maximum	58	61	63	65	68	69	70	70	70	70	70	70	68	66	67	69	67	71	74	76	73	73	75	75	75	76	75	70	69	69	69	70	70	
Minimum	73	72	73	77	76	77	79	81	84	85	85	85	82	84	82	81	79	83	84	86	87	87	86	89	89	90	89	90	89	89	--	83	--	
Maximum	68	70	68	70	72	73	74	75	78	81	80	78	80	82	80	78	78	78	81	81	84	82	81	84	82	81	80	82	83	83	85	--	78	--
Minimum	88	87	89	86	86	84	82	79	82	84	85	84	78	77	79	83	86	87	89	89	88	89	91	91	91	89	90	89	86	86	86	86	86	
Maximum	84	82	83	82	80	80	79	76	77	78	79	78	76	75	77	80	81	83	84	84	83	86	86	87	85	86	86	84	82	81	81	81	81	
Minimum	97	94	90	91	91	89	95	97	95	93	93	90	77	78	78	80	80	82	82	81	80	81	82	81	81	82	81	82	83	85	87	87	83	
Maximum	82	83	86	88	86	85	83	80	78	78	77	75	73	73	73	75	77	77	77	77	77	77	79	79	79	78	78	78	80	81	83	83	79	79
Minimum	85	83	84	83	83	82	84	84	84	85	85	79	74	74	74	76	76	76	77	79	80	81	79	74	73	72	70	67	67	61	--	78	--	
Maximum	80	78	79	80	79	77	78	79	80	81	79	74	70	69	69	72	74	75	73	76	75	79	79	73	70	70	70	67	66	65	--	75	--	

GREAT MIAMI RIVER BASIN--Continued  
3-2716. GREAT MIAMI RIVER NEAR MIAMISBURG, OHIO

LOCATION.--At Chautauqua Road bridge about 2 miles south of Miamisburg, Montgomery County, off of old U.S. Highway 25, and 2.5 miles downstream from gaging station. DRAINAGE AREA (revised).--2,718 square miles at gaging station. RECORDS AVAILABLE.--Chemical analyses: November 1961 to September 1964. Continuous recorder, March to September 1964. REMARKS.--Samples were collected weekly October, July, August, and September, and monthly from November through June. Samples for iron and manganese were filtered clear when collected. Records of discharge are given for Great Miami River at Miamisburg.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Alum. num. (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carb. sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphor- solids (residue at 180°C) PO <sub>4</sub>	Hardness as CaCO <sub>3</sub>		To-Specific conductance (microhm-cm at 25°C)	Oxygen consumed			
																	Calcium, magnesium	Non-carbonate		Col- or	Un- fil- tered		
Oct. 2, 1963.	250	--	--	0.16	0.19	--	--	--	--	--	340	0	106	63	--	0.0	2.6	541	342	54	890	7.3	--
Oct. 17.....	228	--	--	.18	.22	--	--	--	--	--	338	0	105	65	--	.5	5.4	545	343	66	912	7.5	--
Oct. 23.....	250	--	--	.21	.34	--	--	--	--	--	340	0	106	60	--	.0	5.0	537	347	66	889	7.4	--
Oct. 30.....	239	--	--	.81	.15	--	--	--	--	--	338	0	103	60	--	.0	4.6	538	348	70	890	7.4	--
Nov. 13.....	274	--	--	.32	.54	--	--	--	--	--	342	0	100	56	--	.5	6.4	527	346	66	877	7.3	--
Dec. 11.....	409	6.1	--	.22	.25	79	34	41	5.1	--	320	0	92	55	0.8	8.1	5.1	505	337	75	802	7.4	--
Jan. 15, 1964	322	9.3	--	.17	.07	88	32	64	5.2	--	352	0	106	78	.9	4.9	7.5	561	351	62	948	7.3	15
Feb. 17.....	390	5.5	--	.21	.09	82	35	46	4.1	--	316	0	89	64	.7	5.3	4.6	500	349	90	842	7.8	7
Mar. 18.....	5130	6.7	--	.39	.01	73	21	10	2.5	--	208	0	82	22	.2	18	1.2	351	269	98	565	7.2	10
Apr. 15.....	2170	5.8	--	.21	.14	78	31	17	2.4	--	278	0	92	28	.2	13	1.6	418	322	94	683	7.4	7
May 20.....	1170	2.0	--	.12	.10	79	35	24	2.9	--	313	0	93	34	.4	5.5	2.4	439	341	84	733	7.4	15
June 17.....	1320	5.2	--	.14	.22	72	31	22	3.1	--	284	0	84	28	.5	5.9	1.8	403	307	74	660	7.5	10
July 15.....	710	--	--	.18	.22	--	--	--	--	--	280	0	80	36	--	5.2	2.7	412	308	70	682	7.3	--
July 21.....	889	--	--	.23	.28	--	--	--	--	--	294	0	82	35	--	3.4	2.7	439	310	68	684	7.3	--
July 28.....	645	--	--	.19	.24	--	--	--	--	--	312	0	84	42	--	1.3	4.5	439	310	54	735	7.2	--
Aug. 5.....	584	--	--	.15	.19	--	--	--	--	--	307	0	89	42	--	3.6	3.3	450	336	84	762	7.8	--
Aug. 12.....	368	--	--	.29	.03	--	--	--	--	--	330	0	91	46	--	3.1	4.2	451	319	72	762	7.9	--
Aug. 19.....	350	--	--	.31	.41	--	--	--	--	--	310	0	93	54	--	4.2	3.9	480	330	76	799	7.8	--
Aug. 26.....	338	--	--	.20	.47	--	--	--	--	--	310	0	90	49	--	3.7	1.5	462	330	76	784	7.8	--
Sept. 2.....	302	--	--	.19	.28	--	--	--	--	--	308	0	93	54	--	2.1	4.0	488	326	73	810	7.9	--
Sept. 9.....	496	--	--	.19	.49	--	--	--	--	--	311	0	92	54	--	3.6	4.8	474	328	72	806	7.9	--
Sept. 16.....	235	--	--	.20	.32	--	--	--	--	--	322	0	98	64	--	1.6	5.3	508	311	46	866	7.8	--
Sept. 23.....	320	--	--	.23	.31	--	--	--	--	--	310	0	94	53	--	.0	4.8	468	323	68	807	7.8	--
Sept. 30.....	290	--	--	.22	.37	--	--	--	--	--	308	0	98	53	--	2.7	5.6	486	322	69	809	7.7	--

A Daily mean discharge.

GREAT MIAMI RIVER BASIN--Continued  
3-2716. GREAT MIAMI RIVER NEAR MIAMI, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964—Continued											
Date of collection	Dissolved oxygen		Organics			Ammonia nitrogen as NH <sub>4</sub>	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbidity	Threshold odor	
	Parts per million	Percent saturation	Phenols as C <sub>6</sub> H <sub>5</sub> OH	Alkyl benzene sulfonate (ABS)							
Oct. 2, 1963.....	0.4	5	0.014	1.0	3.2	1.5			25	M-32	
Oct. 17.....	.0	0	.000	1.4	3.6	.60			40	M-16	
Oct. 23.....	.0	0	.001	1.2	3.5	.40			50	C-4	
Oct. 30.....	.4	4	.001	1.2	2.7	3.0			40	C-4	
Nov. 13.....	.1	1	.007	1.2	2.6	1.5			150	C-8	
Dec. 11.....	1.4	12	.008	1.0	2.1	.80			30	C-16	
Jan. 16, 1964.....	1.8	14	.009	1.2	4.1	.90			25	C-16	
Feb. 17.....	4.6	38	.002	1.2	2.5	.60			10	C-4	
Mar. 18.....	11.0	90	.010	.2	.0	.15			35	C-8	
Apr. 15.....	8.0	79	.000	.3	.6	.30			20	C-8	
May 20.....	6.0	73	.000	.5	.4	.28			20	M-16	
June 17.....	4.8	57	.002	.4	.7	.35			25	C-4	
July 15.....	2.0	23	.004	.6	.8	.30			35	C-8	
July 21.....	.4	5	.006	.5	1.2	.50			30	C-8	
July 28.....	.4	5	.000	.9	2.9	.70			40	M-8	
Aug. 5.....	.6	8	.002	.8	1.6	.50			25	M-8	
Aug. 12.....	.4	5	.021	1.0	3.5	.70			95	C-16	
Aug. 19.....	1.3	16	.000	.9	2.6	.50			20	C-8	
Aug. 26.....	.2	2	.000	.9	3.1	.80			30	C-8	
Sept. 2.....	2.0	26	.012	1.0	2.4	.70			25	C-8	
Sept. 9.....	1.8	24	.001	1.1	3.8	.40			50	M-8	
Sept. 16.....	1.7	14	.000	1.3	4.4	.70			50	M-8	
Sept. 23.....	1.2	15	.005	1.3	3.1	1.5			55	M-8	
Sept. 30.....	.4	4	.015	1.0	3.5	1.0			90	M-8	

## GREAT MIAMI RIVER BASIN--Continued

3-2716. GREAT MIAMI RIVER NEAR MIAMISBURG, OHIO--Continued

Data from continuous recorder, March to September 1964

Data from continuous recorder, March to September 1964																
Day	FEBRUARY								MARCH							
	Specific conductance (micromhos at 25° C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25° C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..									--	--	--	--	--	--	--	--
2..									--	--	--	--	--	--	--	--
3..									--	--	--	--	--	--	--	--
4..									--	--	--	--	--	--	--	--
5..									--	--	--	--	--	--	--	--
6..									--	--	--	--	--	--	--	--
7..									--	--	--	--	--	--	--	--
8..									--	--	--	--	--	--	--	--
9..									--	--	--	--	--	--	--	--
10..									--	--	--	--	--	--	--	--
11..									--	--	--	--	--	--	--	--
12..									350	330	8.0	7.9	13.8	12.9	44	42
13..									410	345	8.1	7.9	13.8	13.1	45	42
14..									475	410	8.0	7.9	13.2	9.1	46	44
15..									500	475	7.9	7.8	12.4	12.1	48	46
16..									500	470	8.0	7.8	12.6	11.4	50	46
17..									500	500	8.1	7.9	11.7	10.9	50	48
18..									590	500	8.0	7.7	12.4	10.9	50	46
19..									610	590	7.8	7.7	12.3	11.1	47	46
20..									660	610	7.8	7.5	11.7	10.9	--	--
21..									650	600	7.9	7.6	11.7	10.5	--	--
22..									660	620	8.0	7.8	12.0	11.1	--	--
23..									670	640	7.9	7.8	12.0	11.1	--	--
24..									690	660	8.0	7.9	10.8	9.9	53	47
25..									700	670	8.0	7.9	9.9	9.0	57	52
26..									680	610	8.1	7.9	10.1	8.7	56	49
27..									680	660	8.1	7.9	11.5	10.0	50	47
28..									690	670	8.0	7.9	11.1	10.6	51	48
29..									700	670	8.0	7.9	11.5	10.5	48	45
30..									680	650	8.1	7.9	12.5	11.4	47	43
31..									700	660	8.0	7.9	12.2	11.5	46	43
APRIL								MAY								
1..	720	690	8.1	8.0	12.0	11.2	48	45	630	600	8.1	8.0	10.2	9.2	60	59
2..	740	690	8.1	7.9	11.0	10.3	51	47	640	620	8.1	8.0	9.8	8.8	67	60
3..	700	400	8.1	8.0	12.3	10.0	50	46	640	630	8.2	8.0	9.5	8.3	65	64
4..	400	360	8.0	7.9	13.0	12.1	46	45	650	620	8.3	8.0	10.1	8.4	68	65
5..	420	360	8.0	7.9	12.9	12.4	47	45	660	640	8.2	8.0	10.2	7.5	71	67
6..	480	420	8.2	8.0	12.6	9.6	53	46	670	640	8.4	8.1	10.6	6.9	72	69
7..	490	460	8.1	8.0	11.5	11.2	54	52	660	650	8.4	8.1	9.3	6.1	73	71
8..	490	460	8.1	8.0	11.6	11.1	53	51	670	640	8.4	8.1	10.2	6.0	71	70
9..	560	490	8.1	8.0	11.7	11.1	51	49	680	650	8.6	8.1	11.9	6.2	73	70
10..	600	560	8.1	8.0	11.6	11.3	51	50	660	620	8.7	8.3	13.6	6.8	70	69
11..	640	590	8.1	7.9	11.3	10.7	56	51	680	620	8.7	8.3	13.2	7.0	71	69
12..	640	630	8.0	7.9	10.7	10.2	56	56	690	650	8.5	8.1	12.2	6.4	71	69
13..	680	640	8.2	8.0	10.5	9.7	57	56	680	640	8.4	8.0	10.6	5.8	70	68
14..	690	670	8.0	7.9	10.2	9.3	58	57	680	640	8.5	7.9	12.3	6.2	68	66
15..	700	680	8.1	8.0	9.9	8.5	60	58	710	670	8.6	8.1	13.4	6.8	70	66
16..	710	690	8.1	7.9	10.0	8.2	62	59	710	650	8.5	8.0	13.2	6.1	71	68
17..	720	700	8.3	7.9	10.5	7.9	63	60	690	660	8.6	8.1	14.8	6.2	71	69
18..	730	700	8.2	8.0	8.9	6.9	65	63	700	660	8.7	8.2	15.0	6.1	75	70
19..	660	390	8.1	8.0	9.8	8.8	62	57	710	670	8.6	8.1	12.5	4.8	79	73
20..	460	290	8.0	7.9	10.2	9.0	60	59	710	680	8.5	8.0	10.2	3.7	79	75
21..	410	290	8.0	7.6	10.5	9.5	60	56	730	680	8.5	7.9	9.7	3.2	79	75
22..	300	270	7.8	7.6	9.9	9.0	62	60	730	700	8.4	7.9	9.1	3.5	81	75
23..	330	300	7.7	7.6	10.0	9.6	63	60	720	690	8.2	7.8	5.9	2.4	80	76
24..	360	330	7.8	7.6	10.0	9.6	63	60	720	700	8.2	7.8	7.5	2.4	81	75
25..	410	360	7.8	7.7	10.2	9.8	65	60	710	640	8.3	7.9	7.5	3.7	80	75
26..	450	410	7.8	7.7	10.2	9.8	61	59	710	660	8.1	7.7	5.8	2.5	81	76
27..	510	450	8.0	7.8	10.3	9.7	60	58	700	660	8.2	7.7	7.2	2.2	80	76
28..	580	510	8.0	7.9	10.3	9.4	60	57	700	640	8.1	7.9	6.5	4.5	77	72
29..	580	550	8.0	7.9	9.9	9.2	62	60	640	610	8.0	7.7	7.7	5.1	72	68
30..	600	570	8.0	7.9	10.1	9.1	62	60	670	640	8.4	7.8	10.3	5.7	72	68
31..	--	--	--	--	--	--	--	--	670	650	8.5	8.1	10.2	6.3	70	69

## GREAT MIAMI RIVER BASIN--Continued

3-2716. GREAT MIAMI RIVER NEAR MIAMISBURG, OHIO--Continued

Data from continuous recorder, March to September 1964--Continued

Day	JUNE								JULY							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..	680	650	8.7	8.1	13.8	6.6	72	68	740	720	7.8	7.7	.6	.0	86	84
2..	710	660	8.3	8.0	8.8	4.6	72	69	760	710	7.8	7.7	2.2	.0	86	83
3..	680	600	8.1	7.7	8.5	4.6	73	69	740	720	7.9	7.7	3.2	.0	86	83
4..	730	670	8.4	7.8	9.0	4.5	76	70	740	720	7.9	7.7	4.1	.0	86	84
5..	730	700	8.5	7.8	9.4	3.8	76	73	740	700	8.2	7.7	7.0	.6	84	82
6..	740	710	8.5	7.8	10.6	3.2	78	73	740	710	8.3	7.9	6.9	1.6	84	82
7..	720	670	8.7	7.9	12.5	3.0	79	74	760	710	8.1	7.7	5.8	.0	84	77
8..	730	680	9.0	8.1	15.0	3.5	82	75	710	650	7.8	7.6	2.8	.9	81	77
9..	730	690	8.7	7.8	11.7	2.9	83	78	700	620	7.8	7.5	5.0	1.0	83	77
10..	730	670	8.8	8.1	10.5	1.8	84	80	720	690	7.9	7.6	6.6	1.2	85	79
11..	720	680	8.8	8.2	11.7	2.3	82	78	710	680	8.0	7.6	6.9	1.2	86	81
12..	740	690	8.6	8.1	10.0	3.3	84	76	680	660	8.0	7.7	5.2	1.5	86	79
13..	750	630	8.5	8.1	6.4	1.2	84	79	680	640	8.0	7.7	8.1	2.7	80	76
14..	640	580	8.3	7.9	4.6	2.3	82	81	710	680	7.9	7.6	6.6	1.6	78	76
15..	630	560	8.2	7.7	6.3	2.7	82	79	760	680	7.7	7.5	3.7	.9	87	76
16..	690	640	8.3	7.8	7.5	2.6	81	78	760	720	7.8	7.6	5.0	1.0	87	78
17..	700	640	8.3	7.9	9.0	3.7	79	76	730	700	7.9	7.7	6.2	.5	87	82
18..	670	640	8.1	7.8	6.1	3.6	79	77	740	690	7.9	7.6	5.4	.0	87	85
19..	680	660	7.9	7.6	6.2	2.7	81	77	720	700	8.0	7.7	6.0	.3	90	84
20..	710	680	7.9	7.6	4.9	1.9	83	80	710	650	8.0	7.6	5.3	.0	91	87
21..	690	630	7.9	7.7	5.7	2.4	83	81	730	670	7.7	7.5	2.6	.0	90	85
22..	670	560	8.2	7.6	8.7	3.3	85	80	700	600	7.6	7.4	.0	.0	90	84
23..	690	650	8.1	7.7	6.1	1.5	88	83	690	510	7.5	7.3	.5	.0	91	85
24..	690	660	8.3	7.8	8.6	1.5	85	83	730	690	7.7	7.4	1.5	.0	92	88
25..	740	670	8.4	7.9	8.4	1.8	84	79	760	730	7.8	7.5	2.4	.0	92	90
26..	740	710	8.3	7.8	7.6	1.2	86	78	760	720	7.7	7.5	1.5	.0	91	90
27..	760	740	8.1	7.6	4.8	.3	87	82	730	620	7.7	7.5	1.5	.0	93	89
28..	760	740	8.0	7.8	6.0	.3	87	84	730	630	7.6	7.4	1.7	.0	94	90
29..	760	710	8.0	7.9	5.4	.0	87	85	740	720	7.7	7.4	1.5	.0	92	88
30..	720	700	8.0	7.7	2.7	.0	88	85	760	720	7.8	7.5	2.4	.0	91	87
31..	--	--	--	--	--	--	--	--	770	750	7.8	7.5	1.8	.0	90	85

Day	AUGUST								SEPTEMBER							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..	780	760	7.7	7.5	2.5	0.0	87	84	790	760	7.7	7.5	--	--	95	84
2..	800	750	7.8	7.6	2.1	.0	90	86	810	780	7.7	7.5	--	--	93	82
3..	760	700	7.9	7.6	3.9	.4	96	84	840	800	7.6	7.4	--	--	94	84
4..	750	710	7.8	7.6	3.0	.0	93	88	840	810	7.6	7.5	--	--	95	83
5..	760	720	7.7	7.5	1.3	.0	93	88	860	820	7.6	7.4	--	--	90	82
6..	730	700	7.6	7.5	.8	.0	92	86	880	830	7.6	7.4	--	--	83	78
7..	740	710	7.6	7.5	.8	.0	92	86	840	820	7.7	7.5	--	--	82	78
8..	790	740	7.6	7.5	.8	.0	92	86	820	770	7.7	7.5	--	--	97	79
9..	790	780	7.6	7.5	.9	.0	87	84	810	770	7.7	7.5	--	--	97	84
10..	800	770	7.7	7.5	3.0	.0	90	84	850	810	8.0	7.7	2.2	0.3	98	85
11..	790	750	7.7	7.5	2.6	.0	92	84	880	840	7.9	7.8	1.1	.1	95	87
12..	780	750	7.6	7.5	--	.0	86	81	900	870	7.9	7.8	2.4	.5	87	78
13..	790	740	7.6	7.5	--	.0	83	77	950	900	7.9	7.8	1.5	.4	78	72
14..	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	71
15..	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16..	--	--	--	--	--	--	--	--	880	860	7.9	7.8	2.7	.0	86	83
17..	780	760	7.8	7.7	3.2	--	88	83	890	860	7.9	7.8	--	.0	87	77
18..	800	750	7.8	7.6	3.3	1.2	90	81	900	880	7.8	7.8	.9	.0	86	80
19..	810	780	7.7	7.6	1.5	.3	90	81	--	--	8.2	8.1	--	--	87	80
20..	820	780	7.7	7.6	1.9	.1	92	81	--	--	8.2	8.1	--	--	87	80
21..	820	780	7.6	7.5	1.9	.3	92	81	--	--	8.1	--	--	--	--	82
22..	810	780	7.5	7.4	1.5	.3	84	81	780	720	7.6	7.5	1.7	.0	89	82
23..	810	790	7.6	7.5	.9	.3	82	80	820	770	7.7	7.5	1.8	.4	88	82
24..	810	750	7.6	7.5	1.5	.1	90	81	850	810	7.7	7.6	1.2	.4	84	78
25..	780	750	7.5	7.4	1.3	.0	89	81	850	820	7.7	7.6	2.2	.4	82	73
26..	790	780	7.6	7.4	.8	.1	86	80	850	830	7.8	7.6	2.4	.7	82	75
27..	830	790	7.6	7.3	--	.0	90	82	860	840	7.7	7.7	1.2	.7	79	70
28..	830	800	7.6	7.4	.2	.0	94	82	860	840	7.7	7.7	1.1	.4	75	69
29..	820	780	7.7	7.4	1.9	.0	90	83	860	800	7.7	7.6	1.0	.7	75	68
30..	820	780	7.7	7.3	1.2	.0	87	84	820	780	7.7	7.6	.6	.3	77	68
31..	810	760	7.7	7.5	--	--	96	86	--	--	--	--	--	--	--	--

## GREAT MIAMI RIVER BASIN--Continued

## 3-2721. GREAT MIAMI RIVER AT MIDDLETOWN, OHIO

LOCATION.--At left bank at County Park dock at Middletown, Butler County, about 0.6 mile downstream from New York Central Railroad bridge, and 0.3 mile downstream from Twin Creek.

DRAINAGE AREA (revised).--3,134 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: July 1963 to September 1964.

REMARKS.--Samples were collected weekly October, July, August, and September, and monthly November through June. Samples for iron and manganese were filtered clear when collected. No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at H <sup>+</sup> 25°C)	Specific conductance (micro-mhos at 25°C)	pH	Color	Oxygen consumed
																		Calcium	Non-carbonate					
Oct. 2, 1963.				0.26	0.10	--	--	--	--	--	346	0	98	62	--	1.6	2.4	532	340	56	863	7.3	--	--
Oct. 17.....		--		.15	.04	--	--	--	--	--	332	0	101	59	--	2.4	5.0	527	344	72	857	7.5	--	--
Oct. 23.....		--		.07	.07	--	--	--	--	--	344	0	98	59	--	2.2	5.6	528	344	92	879	7.5	--	--
Nov. 1.....		--		.13	.13	--	--	--	--	--	348	0	94	59	--	3.0	5.0	518	346	60	880	7.4	--	--
Nov. 13.....		--		.23	.23	--	--	--	--	--	348	0	94	59	--	3.0	5.0	518	346	60	880	7.4	--	--
Dec. 11.....		5.9		.92	.17	78	35	33	4.3		325	0	87	43	.6	7.8	5.0	475	339	72	748	7.2	--	--
Jan. 16, 1964		7.3		.12	.03	83	32	55	4.8		332	0	97	64	.7	5.1	6.0	507	339	66	872	7.2	13	--
Feb. 17.....		5.8		.18	.13	84	32	72	4.2		316	0	103	96	.8	5.8	3.9	562	341	82	963	7.0	20	--
Mar. 18.....		6.7		.26	.01	71	22	11	2.5		206	0	81	24	.3	1.9	1.3	343	268	98	566	6.9	13	--
Apr. 15.....		5.9		.26	.26	80	29	17	2.3		276	0	81	27	.1	1.4	1.4	415	319	92	681	7.2	25	--
May 20.....		1.1		.14	.17	82	34	22	2.6		312	0	90	33	.4	1.5	1.8	435	345	89	730	7.2	15	--
June 17.....		4.6		.14	.30	76	33	22	3.1		296	0	85	30	.5	6.6	1.6	420	325	81	690	7.0	10	--
July 15.....		--		.13	.15	--	--	--	--	--	294	0	79	34	--	6.4	2.1	422	316	74	894	7.0	--	--
July 21.....		--		.29	.10	--	--	--	--	--	280	0	76	35	--	4.8	2.8	404	299	69	869	7.0	--	--
July 29.....		--		.12	.10	--	--	--	--	--	286	0	75	38	--	4.0	2.7	412	297	62	890	6.8	--	--
Aug. 5.....		--		.12	.08	--	--	--	--	--	301	0	88	42	--	3.1	3.3	442	324	77	756	8.0	--	--
Aug. 12.....		--		.18	.15	--	--	--	--	--	306	0	89	45	--	2.4	2.6	456	330	78	765	7.9	--	--
Aug. 19.....		--		.13	.08	--	--	--	--	--	318	0	94	46	--	4.4	3.8	468	336	75	782	7.8	--	--
Aug. 26.....		--		.13	.12	--	--	--	--	--	305	0	87	51	--	2.2	3.7	457	318	88	777	7.9	--	--
Sept. 2.....		--		.13	.13	--	--	--	--	--	315	0	90	54	--	3.8	3.2	480	324	74	824	8.2	--	--
Sept. 9.....		--		.12	.12	--	--	--	--	--	324	0	90	66	--	3.6	4.4	524	336	70	876	8.1	--	--
Sept. 16.....		--		.12	.02	--	--	--	--	--	324	0	98	51	--	7.3	3.7	426	292	59	741	7.9	--	--
Sept. 23.....		--		.14	.16	--	--	--	--	--	284	0	100	60	--	2.9	5.1	514	339	68	862	7.7	--	--
Sept. 30.....		--		.19	.13	--	--	--	--	--	330	0	100	60	--	2.9	5.1	514	339	68	862	7.7	--	--

GREAT MIAMI RIVER BASIN--Continued  
3-2721. GREAT MIAMI RIVER AT MIDDLETOWN, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics			Ammonia nitrogen as $\text{NH}_4$	Nitrite ( $\text{NO}_2$ )	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as $\text{C}_6\text{H}_5\text{OH}$	Alkyl benzene sulfonate (ABS)						
Oct. 2, 1963.....	1.2	14	0.004	1.2		3.3	0.50		15	M-8
Oct. 17.....	1.6	19	.008	1.1		3.7	2.0		6	M-6
Oct. 21.....	1.8	12	.014	1.2		3.7	1.0		8	M-8
Oct. 30.....	2.0	21	.012	1.1		2.6	1.0		8	C-2
Nov. 13.....	1.1	10	.000	1.2		2.7	1.0		20	M-8
Dec. 11.....	2.6	23	.010	1.0		1.2	1.0		20	M-8
Jan. 16, 1964.....	3.0	24	.000	1.1		3.2	.90		15	C-4
Feb. 17.....	2.6	23	.002	1.0		1.6	.60		23	C-4
Mar. 18.....	10.4	87	.000	.2		.1	.15		40	C-4
Apr. 13.....	7.4	73	.004	.3		.7	.09		43	M-4
May 20.....	5.6	71	.008	.4		.6	.07		12	M-8
June 17.....	4.1	50	.004	.4		.3	.20		85	M-1
July 15.....	1.2	15	.003	.5		.4	.70		30	M-8
July 21.....	2.5	34	.006	.5		.6	.60		15	M-16
July 29.....	1.4	19	.001	.6		1.4	.60		17	M-16
Aug. 5.....	5.2	72	.006	.8		1.2	.50		15	M-4
Aug. 12.....	1.6	20	.003	.8		1.7	.60		20	M-8
Aug. 19.....	1.5	19	.001	.8		2.0	.30		10	M-8
Aug. 26.....	1.2	15	.000	.9		2.7	.60		6	E-8
Sept. 1.....	3.3	43	.002	1.0		1.8	.70		10	M-4
Sept. 9.....	--	--	.003	.9		1.8	.60		25	M-16
Sept. 16.....	5.2	63	.000	1.0		2.0	.70		9	M-8
Sept. 23.....	6.4	82	.000	.8		1.8	.60		20	M-16
Sept. 30.....	.8	9	.001	1.0		2.9	.70		40	M-16

GREAT MIAMI RIVER BASIN--Continued  
3-2724. GREAT MIAMI RIVER NEAR MIDDLETOWN, OHIO

LOCATION.--At dock on left bank beneath Baltimore and Ohio Railroad bridge near Middletown, Butler County, 0.7 mile downstream from Woodsdale Road Bridge. DRAINAGE AREA (revised).--3,280 square miles, approximately.  
RECORDS AVAILABLE.--Chemical analyses: July 1963 to September 1964.  
REMARKS.--Samples were collected weekly October, July, August and September, and monthly from November to June. Samples for iron and manganese were filtered clear when collected. No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Alu- min- ium (Al)	Iron (Fe)	Man- gan- ese (Mn)	Cal- cium (Ca)	Mag- ne- sium (Mg)	Sodium (Na)	Pot- as- sium (K)	Lith- ium (Li)	Bi- car- bon- ate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluo- ride (F)	Ni- trate (NO <sub>3</sub> )	Phos- phor- solids (residue at 180°C) PO <sub>4</sub>	Hardness as CaCO <sub>3</sub>		To-Specific acid- ity (micro- mhos at 25°C)	pH	Col- or	Oxygen consumed		
																	Cal- cium, mag- nesium	Non-car- bon- ate						
Oct. 2, 1963.				0.51	0.23	--	--	--	--	--	228	0	216	64	--	1.1	0.09	633	372	185	953	7.0	--	
Oct. 17.	--	--	--	.14	.15	--	--	--	--	--	244	0	203	70	--	.0	.02	631	368	168	984	7.1	--	
Oct. 23.	--	--	--	.18	.11	--	--	--	--	--	254	0	197	68	--	.4	.01	621	370	162	973	7.1	--	
Oct. 30.	--	--	--	.34	.17	--	--	--	--	--	282	0	173	60	--	.0	.10	602	370	139	958	7.2	--	
Nov. 13.	--	--	--	1.0	.20	--	--	--	--	--	232	0	203	60	--	2.0	.11	606	367	177	941	6.9	--	
Dec. 11.	6.4	6.4	6.4	2.5	.15	81	36	42	4.8	--	255	0	159	56	--	.6	6.0	.08	553	350	141	828	6.9	--
Jan. 16, 1964				6.8	.21	87	33	60	4.7	--	228	0	183	77	--	.6	3.9	.11	583	353	166	946	6.8	5
Feb. 17.	5.8	5.8	5.8	1.9	.12	87	32	49	4.1	--	264	0	147	62	--	.6	5.6	.26	541	349	135	877	6.8	7
Mar. 18.	6.8	6.8	6.8	1.66	.00	73	21	11	2.5	--	200	0	84	22	--	2.18	.48	.31	289	102	599	7.0	12	
Apr. 15.	6.0	6.0	6.0	1.98	.12	82	28	15	2.5	--	280	0	103	25	--	.0	.15	.60	428	320	107	678	7.1	17
May 20.	1.3	1.3	1.3	1.0	.13	82	33	22	2.7	--	286	0	114	34	--	.4	6.8	.42	449	340	106	732	7.0	15
June 17.	5.4	5.4	5.4	.41	.13	73	32	23	3.1	--	274	0	90	31	--	.5	6.8	.82	421	314	89	680	7.0	8
July 15.	--	--	--	.29	.16	--	--	--	--	--	238	0	125	32	--	4.9	.16	439	322	127	695	6.8	--	
July 21.	--	--	--	.49	.10	--	--	--	--	--	240	0	130	38	--	3.8	.26	464	319	122	724	6.9	--	
July 29.	--	--	--	.59	.11	--	--	--	--	--	236	0	138	39	--	3.8	.09	475	324	130	746	6.7	--	
Aug. 5.	--	--	--	.58	.13	--	--	--	--	--	252	0	137	44	--	3.8	.14	491	338	131	792	7.5	--	
Aug. 12.	--	--	--	.66	.26	--	--	--	--	--	214	0	147	46	--	3.0	.13	483	318	142	762	7.5	--	
Aug. 19.	--	--	--	.34	.06	--	--	--	--	--	235	0	166	52	--	2.6	.13	547	346	153	840	7.4	--	
Aug. 26.	--	--	--	.17	.15	--	--	--	--	--	232	0	172	54	--	3.0	.09	550	346	156	852	7.5	--	
Sept. 2.	--	--	--	.47	.03	--	--	--	--	--	196	0	204	57	--	1.9	.09	582	351	190	883	7.2	--	
Sept. 9.	--	--	--	.51	.18	--	--	--	--	--	224	0	193	58	--	2.6	.05	583	365	181	898	7.5	--	
Sept. 16.	--	--	--	.61	.19	--	--	--	--	--	190	0	232	66	--	.5	.15	623	364	208	945	7.2	--	
Sept. 23.	--	--	--	.59	.14	--	--	--	--	--	218	0	191	60	--	.0	.09	571	346	167	899	7.3	--	
Sept. 30.	--	--	--	.30	.13	--	--	--	--	--	210	0	208	61	--	2.6	.15	604	356	184	912	7.2	--	



## GREAT MIAMI RIVER BASIN--Continued

3-2724. GREAT MIAMI RIVER NEAR MIDDLETOWN, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Chemical analysis, in parts per million, water for October 1963 to September 1964	Dissolved oxygen			Organics			Ammonia nitrogen as $\text{NH}_4$	Nitrite ( $\text{NO}_2$ )	Cyanide (CN)	Turbidity	Threshold odor
	Date of collection	Parts per million	Percent saturation	Phenols as $\text{C}_6\text{H}_5\text{OH}$	Alkyl benzene sulfonate (ABS)						
Oct. 2, 1963.....	5.4	61	0.005	1.0			3.5	0.10		15	V-16
Oct. 23.....	2.6	40	.000	1.1			3.8	.10		8	M-8
Oct. 23.....	4.0	44	.000	1.1			4.1	.10		8	M-8
Oct. 30.....	4.4	45	.000	1.1			3.8	.10		20	M-4
Nov. 13.....	1.9	17	.010	1.0			3.7	.60		45	M-16
Dec. 11.....	4.0	34	.016	1.0			2.8	1.0		25	M-2
Jan. 16, 1964.....	5.3	40	.020	1.0			3.9	.50		140	Ch-16
Feb. 17.....	4.5	39	.000	.9			2.8	.70		50	C-16
Mar. 18.....	10.2	86	.011	.3			.1	.18		50	C-4
Apr. 15.....	7.5	75	.005	.3			.3	.30		23	M-4
May 20.....	3.9	22	.006	.4			.4	.06		20	M-6
June 17.....	4.6	56	.005	.4			.4	.40		70	M-4
July 15.....	5.8	69	.000	.4			.7	.15		35	M-8
July 21.....	6.0	80	.006	.5			.5	.20		20	M-16
July 29.....	6.9	93	.000	.6			1.3	.40		24	M-8
Aug. 5.....	7.6	103	.000	.7			1.2	.40		20	M-8
Aug. 12.....	3.4	41	.001	.6			1.7	.30		50	M-8
Aug. 19.....	4.3	52	.001	.8			2.3	.30		10	M-4
Aug. 26.....	3.2	40	.000	.9			2.5	.40		10	E-8
Sept. 9.....	5.6	70	.013	.9			2.2	.30		20	M-16
Sept. 9.....	--	--	.003	.8			3.0	.30		30	M-32
Sept. 16.....	5.8	69	.005	1.0			3.2	.20		20	M-16
Sept. 23.....	4.4	57	.006	1.0			3.8	.20		20	M-32
Sept. 30.....	5.2	58	.000	.9			4.0	.30		15	M-64



GREAT MIAMI RIVER BASIN--Continued  
3-2740.5. GREAT MIAMI RIVER NEAR HAMILTON, OHIO

LOCATION.--At American Materials Company private bridge at Hamilton, Butler County, about 5.5 miles below gaging station.  
RECORDS AREA (revised).--3,677 square miles.  
DRAINAGE AVAILABLE.--Chemical analyses: July 1963 to September 1964.

REMARKS.--Samples were collected weekly October, July, August, and September, and monthly November through June. Samples for iron and manganese were filtered clear when collected. Records of discharge are given for Great Miami River at Hamilton.

Chemical analyses, in parts per million, water year October 1963 to September 1964																								
Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific conductance (micro-mhos at H <sup>+</sup> 25°C)	pH or Col.	Oxygen consumed		
																		Calcium, mg./l.	Non-carbonate, mg./l.			Filtered	Unfiltered	
Oct. 2, 1963.	297	--	--	0.26	0.21	--	--	--	--	--	296	0	144	60	--	0.9	0.32	570	356	113	--	903	7.2	--
Oct. 7, .....	259	--	--	0.23	0.21	--	--	--	--	--	296	0	158	62	--	0	0.51	595	368	125	--	950	7.4	--
Oct. 17, .....	319	--	--	0.21	0.22	--	--	--	--	--	290	0	159	62	--	4	0.33	587	364	126	--	935	7.3	--
Oct. 23, .....	288	--	--	0.27	0.29	--	--	--	--	--	336	0	130	60	--	5	0.32	570	372	96	--	933	7.4	--
Oct. 30, .....	436	--	--	0.40	0.35	--	--	--	--	--	268	0	179	59	--	1.9	0.16	594	368	148	--	938	7.1	--
Nov. 13, .....	497	6.4	--	1.8	0.31	88	34	45	5.0	--	252	0	175	60	0.5	6.2	0.08	583	360	153	--	869	6.8	--
Dec. 11, .....	436	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 16, 1964	360	7.1	--	2.7	0.21	95	30	60	4.9	--	244	0	188	75	7	5.2	0.28	590	361	161	--	958	6.8	6
Feb. 17, .....	650	5.7	--	1.4	0.20	90	32	48	4.3	--	248	0	168	60	5	5.3	0.11	559	356	153	--	883	6.8	7
Mar. 18, .....	378	5.8	--	0.62	0.11	79	29	11	2.5	--	198	0	83	23	3	18	41	341	264	102	--	677	7.2	7
Apr. 15, .....	1600	1.5	--	0.43	0.09	82	33	20	2.9	--	280	0	182	33	3	8.5	0.80	437	340	103	--	723	7.0	10
May 20, .....	1580	5.1	--	0.42	0.29	71	28	21	3.1	--	254	0	89	30	4	10	0.66	408	292	84	--	643	6.9	10
June 17, .....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July 15, .....	900	--	--	--	--	--	--	--	--	--	252	0	123	36	--	5.9	0.24	453	326	119	--	721	6.9	--
July 21, .....	676	--	--	0.42	0.10	--	--	--	--	--	248	0	128	40	--	5.2	0.36	474	328	125	--	747	6.8	--
July 29, .....	661	--	--	0.31	0.22	--	--	--	--	--	260	0	126	43	--	4.2	0.27	488	332	119	--	765	6.7	--
Aug. 5, .....	654	--	--	0.26	0.15	--	--	--	--	--	251	0	137	45	--	3.5	0.28	497	338	132	--	797	7.6	--
Aug. 12, .....	715	--	--	0.23	0.20	--	--	--	--	--	214	0	140	44	--	2.5	0.27	469	308	132	--	742	7.5	--
Aug. 19, .....	436	--	--	0.30	0.18	--	--	--	--	--	247	0	150	52	--	2.6	0.28	536	341	138	--	864	7.6	--
Aug. 26, .....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sept. 2, .....	425	--	--	0.19	0.28	--	--	--	--	--	230	0	182	52	--	1.5	0.25	562	362	173	--	864	7.6	--
Sept. 9, .....	394	--	--	0.25	0.20	--	--	--	--	--	230	0	181	56	--	2.5	0.36	572	358	169	--	876	7.6	--
Sept. 16, .....	263	--	--	0.43	0.34	--	--	--	--	--	200	0	230	61	--	1.1	0.44	624	375	211	--	938	7.4	--
Sept. 23, .....	360	--	--	0.54	0.31	--	--	--	--	--	238	0	182	62	--	0.2	0.31	561	350	155	--	905	7.6	--
Sept. 30, .....	384	--	--	0.24	0.28	--	--	--	--	--	212	0	209	62	--	3.6	0.27	652	360	186	--	903	7.9	--

Chemical analyses, in parts per million, water year October 1963 to September 1964

GREAT MIAMI RIVER BASIN--Continued  
3-2740.5. GREAT MIAMI RIVER NEAR HAMILTON, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued										
Date of collection	Dissolved oxygen		Organics			Ammonia nitrogen as NH <sub>4</sub>	Nitrite (NO <sub>3</sub> )	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as C <sub>6</sub> H <sub>5</sub> OH	Alkyl benzene sulfonate (ABS)						
Oct. 2, 1963.....	2.8	31	0.005	1.0		3.6	0.30		20	V-8
Oct. 17.....	2.6	29	.000	1.1		4.1	.20		20	M-4
Oct. 23.....	2.2	24	.006	1.1		4.0	.10		20	Dg-4
Oct. 30.....	2.2	23	.000	1.1		3.8	.20		30	M-2
Nov. 13.....	2.3	21	.003	1.0		4.4	.50		35	M-2
Nov. 13.....	2.3	21	.003	1.0		4.4	.50		35	M-2
Dec. 11.....	4.8	40	.008	1.0		3.5	.90		40	M-2
Jan. 16, 1964.....	5.4	43	.000	.9		4.8	.50		140	C-32
Feb. 17.....	4.9	43	.001	1.0		3.0	.60		80	M-4
Mar. 18.....	10	86	.000	.2		3	.18		80	C-8
Apr. 15.....	7.4	74	.000	.3		5	.40		30	M-4
May 20.....	6.9	84	.007	.3		4	.26		20	M-8
June 17.....	4.7	58	.007	.3		3	.25		90	M-2
July 15.....	6.6	80	.000	.5		.7	.35		70	M-4
July 21.....	4.8	64	.005	.5		.8	.50		15	M-8
July 29.....	4.6	61	.000	.6		.9	.50		100	M-16
Aug. 5.....	6.0	79	.001	.6		1.1	.50		20	M-16
Aug. 12.....	3.2	38	.000	.6		1.5	.60		25	M-8
Aug. 19.....	3.4	42	.000	.7		1.8	1.0		20	E-4
Aug. 26.....	3.4	42	.000	.8		2.5	.80		15	E-4
Sept. 2.....	5.1	57	.007	.9		3.1	.70		10	M-8
Sept. 16.....	2.6	31	.009	.9		3.2	.70		45	M-32
Sept. 23.....	3.6	44	.000	1.1		4.1	.40		35	M-32
Sept. 30.....	3.3	36	.008	.8		3.7	.70		45	M-64

## GREAT MIAMI RIVER BASIN--Continued

3-2766. GREAT 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 (revised).--5,356 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1964.

Water temperatures: October 1956 to September 1964. Maximum daily, 1,090 microhms Jan. 6; minimum daily, 313 microhms Apr. 22. EXTREMES 1963-64.--Specific conductance: Maximum daily, 33°F on several days during December and January.

Water temperatures: Maximum daily, 90°F Aug. 3; minimum, 33°F on several days during December and January.

EXTREMES 1956-64.--Specific conductance: Maximum daily, 1,090 microhms Jan. 6, 1964; minimum daily, 296 microhms Jan. 28, 1962.

Water temperatures: Maximum, 90°F July 23-27, Aug. 3, 1964; minimum, freezing point on several days during winter months.

REMARKS.--Records of specific conductance of daily samples available in district office at Columbus, Ohio. The samples for this station were analyzed as follows: (1) Analysis based on maximum daily specific conductance for the month, (2) analysis based on the minimum daily specific conductance for the month, and (3) analysis of the composite of all daily samples for the month. No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (microhms at 25°C)	pH	Color
															Calcium	Non-carbonate			
Oct. 12, 1963.....								284	0	129	65	0.6	15	575	356	123	902	7.6	
Oct. 29.....								248	0	169	70	.7	18	634	377	174	976	7.2	
Oct. 1-31.....								248	0	167	65	.7	16	597	366	163	948	7.0	
Nov. 2.....								254	0	178	74	.6	22	606	377	169	963	7.3	
Nov. 22.....								262	0	126	49	.6	14	484	333	115	874	6.7	
Nov. 1-30.....								246	0	166	62	.7	18	569	359	137	912	6.7	
Dec. 17.....								254	0	137	48	.7	23	515	350	142	827	7.3	
Dec. 30.....								216	0	166	82	.9	48	598	365	188	976	7.5	
Dec. 1-31.....								234	0	169	64	.8	26	564	360	168	912	7.1	
Jan. 6, 1964.....								198	0	197	128	.6	24	668	358	196	1090	6.6	
Jan. 30.....								249	0	121	60	.6	25	471	330	126	806	6.6	
Jan. 1-31.....								212	0	168	88	.7	30	564	350	176	956	6.6	
Feb. 13.....								224	0	154	42	.8	14	513	331	147	809	7.1	
Feb. 25.....								228	0	169	90	.6	20	620	363	176	984	7.1	
Feb. 1-29.....								238	0	158	53	.8	18	575	362	167	889	7.2	
Mar. 2.....								224	0	183	80	.7	24	610	377	193	950	6.9	
Mar. 6.....								154	0	68	26	.4	22	306	218	92	483	7.4	
Mar. 1-8, 21-31.....								218	0	108	42	.4	18	434	308	129	684	6.7	
Apr. 1.....								256	0	98	27	.4	18	413	334	124	697	7.2	
Apr. 22.....								135	0	33	7.0	.2	1.1	193	149	38	313	7.0	
May 1-30.....								180	0	70	19	.3	17	369	269	105	520	6.8	
May 1.....								196	16	70	20	.4	18	385	283	129	565	6.8	
May 21.....								268	0	97	35	.5	19	452	347	129	733	8.1	
May 1-31 A.....								256	0	96	28	.4	13	412	322	112	676	7.8	

June 9, 1964.										
232	11	106	37	5	12	442	324	115	720	8.6
180	2	71	26	4	9.3	326	230	79	532	8.3
242	0	97	33	5	11	414	316	117	682	8.0
240	6	117	44	5	13	496	340	133	749	8.4
220	0	100	32	5	7.4	376	282	102	654	8.1
242	0	108	36	5	10	402	310	111	724	8.0
192	3	120	39	4	8.0	420	282	119	663	8.4
220	0	135	46	4	7.9	520	324	155	757	8.7
220	0	135	46	4	11.6	505	328	142	768	8.0
220	0	145	45	6	7.6	489	324	144	753	7.5
200	0	190	62	6	16	585	362	198	879	7.7
215	0	163	58	6	14	539	350	174	850	7.7
76										
Aug. 13.....										
192	3	120	39	4	8.0	420	282	119	663	8.4
220	0	135	46	4	7.9	520	324	155	757	8.7
220	0	135	46	4	11.6	505	328	142	768	8.0
220	0	145	45	6	7.6	489	324	144	753	7.5
200	0	190	62	6	16	585	362	198	879	7.7
215	0	163	58	6	14	539	350	174	850	7.7
Sept. 1-30.....										
192	3	120	39	4	8.0	420	282	119	663	8.4
220	0	135	46	4	7.9	520	324	155	757	8.7
220	0	135	46	4	11.6	505	328	142	768	8.0
220	0	145	45	6	7.6	489	324	144	753	7.5
200	0	190	62	6	16	585	362	198	879	7.7
215	0	163	58	6	14	539	350	174	850	7.7

A Sample for May 12 includes 50 ppm turbidity (as SiO<sub>2</sub>).

[illegible]

## 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.

DEATHS: 1959-64. --Chemical analyses: October 1959 to September 1964.

RECORDS AVAILABLE: --Chemical analyses: October 1959 to September 1964.

Water temperatures: October 1959 to September 1964.

EXTREMES: 1963-64. --Specific conductance: Maximum daily, 776 micromhos Nov. 26; minimum daily, 192 micromhos Mar. 12.

Water temperatures: Maximum, 87°F Aug. 4-7; minimum, freezing point Jan. 11.

EXTREMES: 1959-64. --Specific conductance: Maximum daily, 810 micromhos Oct. 21, 1962; minimum daily, 167 micromhos Mar. 3, 1962.

Water temperatures: Maximum, 88°F July 14, 1962; minimum, freezing point on many days during winter months.

REMARKS: --Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September). No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Calcium sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at 25°C)	pH	Detergent (MB AS)
																		Calcium, magnesium, non-pestum	Non-pestum			
Oct. 1, 1963.						43	9.7				72	0	96		6.8		276	147	88	462	6.6	--
Oct. 10.....						--	--				--	--	121		--	0.12	--	--	--	536	6.5	0.1
Oct. 20.....						56	13				76	0	138		8.0	--	380	193	131	602	6.8	--
Oct. 30.....						54	13				76	0	140		8.2	--	392	188	126	626	7.2	--
Nov. 10.....						--	--				--	--	160		--	--	--	--	--	629	6.5	--
Nov. 20.....						--	14				--	--	186		12	--	--	--	--	747	6.8	1
Nov. 26.....						66	14				46	0	182		--	--	473	223	153	774	6.3	--
Dec. 1.....						80	13				36	0	136		9.5	--	453	203	174	750	6.3	--
Dec. 11.....						--	--				--	--	174		--	--	--	--	--	629	6.9	2
Dec. 21.....						--	--				--	--	174		8.2	--	288	140	104	575	6.5	--
Dec. 30.....						41	9.2				44	0	106		8.2	--	--	--	--	487	6.5	--
Jan. 6, 1964.						40	10				48	0	109		8.7	--	298	141	102	490	6.6	--
Jan. 12.....						--	--				--	--	98		--	--	--	--	--	440	7.2	1
Jan. 17.....						--	--				--	--	--		--	--	--	--	--	294	--	--
Jan. 24.....						--	--				--	--	82		--	--	--	--	--	352	7.1	--
Jan. 26.....						--	--				--	--	86		--	--	--	--	--	348	6.8	0
Feb. 8.....						31	7.3				38	0	73		7.7	--	196	108	76	330	6.7	--
Feb. 9.....						--	--				--	--	75		--	--	--	--	--	321	6.7	0
Feb. 16.....						--	--				--	--	61		--	--	--	--	--	289	6.6	0
Feb. 24.....						23	5.8				32	0	59		4.4	--	142	82	56	246	6.3	--
Feb. 28.....						--	--				--	--	58		--	--	--	--	--	260	6.8	0







## KENTUCKY RIVER BASIN

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

LOCATION:--At gaging station near right bank 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.

DATA:--See Appendix A, Table 1.

RECORDS AVAILABLE:--Chemical analyses: November 1949 to August 1950, August 1957 to September 1959 (periodic), October 1962 to September 1964.

Water temperatures: October 1949 to September 1964.

EXTREMES: 1963-64.--Specific conductance: Maximum daily, 1,000 micromhos Nov. 11; minimum daily, 128 micromhos Apr. 6.

Water temperatures: Maximum, 91°F June 28; minimum, freezing point Dec. 12.

EXTREMES: 1949-64.--Specific conductance (1962-64): Maximum daily, 1,720 micromhos Dec. 19, 20, 1962; minimum daily, 128 micromhos Apr. 6, 1964.

Water temperatures: Maximum, 93°F Aug. 1, 1953; minimum, freezing point on many days during winter months.

REMARKS:--Values reported for iron are in solution when analyzed. Records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily conductance for each month, (3) maximum daily turbidity for each month, and (4) a composite analysis of at least 10 daily samples for each month. No samples collected Mar. 8-31, June 10 to July 13. Small diversion by city of Hazard waterworks and electric plant above station.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbocation (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific acidity (micro-mhos at 25°C)	Color or pH	Turbidity
																			Calcium-magnesium	Non-carbonate			
Oct. 1, 1963.	920	3.4	--	0.00	--	--	--	--	--	--	96	0	210	18	--	--	--	470	203	125	617	6.6	3
Oct. 25.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5
Oct. 30.....	3.0	4.0	--	.00	--	--	--	--	--	--	158	0	315	25	--	--	--	618	273	143	916	7.7	4
Oct. 1-30....	11.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	509	--	--	761	--	--
Nov. 11.....	28	4.8	--	.00	--	--	--	--	--	--	144	0	372	21	--	--	--	680	284	166	1000	7.3	5
Nov. 30.....	305	4.8	--	.22	--	--	--	--	--	--	28	0	166	9.0	--	--	--	274	163	140	436	7.0	10
Nov. 1-30....	34.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	595	--	--	868	--	70
Dec. 2.....	195	6.6	--	.01	--	--	--	--	--	--	24	0	161	12	--	--	--	260	153	134	423	6.1	5
Dec. 5.....	97	2.6	--	.00	--	--	--	--	--	--	52	0	289	22	--	--	--	453	222	180	688	6.4	3
Dec. 11.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	55
Dec. 1-14....	128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	302	--	--	482	--	--
Jan. 18, 1964	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	470
Jan. 21.....	1420	6.7	--	.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	55	44	157	6.1	3
Jan. 22.....	1230	3.8	--	.02	--	--	--	--	--	--	13	0	47	9.0	--	--	--	231	127	103	373	6.1	5
Jan. 7-30....	1398	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	158	--	--	512	--	--
Feb. 10.....	1120	6.8	--	.02	--	--	--	--	--	--	42	0	112	10	--	--	--	218	115	80	341	6.6	18
Feb. 11.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	200
Feb. 23.....	806	6.3	--	.06	--	--	--	--	--	--	12	0	43	4.5	--	--	--	86	46	36	134	6.3	6
Feb. 1-29....	897	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	142	--	--	231	--	--

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

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbocationate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To- Specific conductance (micro-mhos at 25°C)	pH	Col- or ity	Tur- bid- ity
																			Calcium	Non- carbonate				
Mar. 1-7, 1964	1876	7.1		0.03							20	0	62	5.5				126	68	52	196	7.5		5
Mar. 6	1310	7.6		.01							18	0	38	2.0				89	48	33	128	7.2		5
Apr. 30	426	6.9		.01							50	0	107	8.0				226	122	81	335	7.7		5
Apr. 1-30	1128	--		--							--	--	--	--				138	--	--	232	--		--
May 23	114	8.9		.01							64	0	310	9.0				531	300	247	727	7.8		5
May 31	102	8.4		.01							40	0	87	4.0				184	103	70	290	7.5		360
May 1-31	141	--		--							--	--	--	--				290	--	--	469	--		--
June 1-14	223	8.2		.00							68	0	142	7.0				272	158	103	436	7.1		5
July 14-30	826	6.8		.01							48	0	171	5.0				310	171	132	464	7.4		5
Aug. 4	1610	9.9		.31							30	0	128	5.0				205	120	96	328	7.5		5
Aug. 5	--	--		--							--	--	--	--				--	--	--	--	--		1200
Aug. 31	8.7	6.1		.00							93	0	167	11				383	198	122	569	7.8		5
Aug. 1-31	153	--		--							--	--	--	--				288	--	--	454	--		--
Sept. 1	5.4	4.7		.03							92	0	186	9.0				373	204	129	567	7.4		5
Sept. 24	36	8.4		.01							79	0	299	11				568	290	225	788	7.5		5
Sept. 27	--	--		--							--	--	--	--				--	--	--	--	--		5900
Sept. 1-28	15.0	--		--							--	--	--	--				454	--	--	674	--		--



## KENTUCKY RIVER BASIN--Continued

3-2862. DIX RIVER AT DIX DAM, NEAR BURGIN, KY.

LOCATION.--Temperature recorder at stage station on left bank, 400 feet upstream from Dix Dam spillway outlet, 0.6 mile downstream from powerhouse (at toe of dam), 2.4 miles upstream from mouth, and 4.4 miles northeast of Burgin, Mercer County. DRAINAGE AREA, 129 square miles. RECORDS AVAILABLE.--Water temperatures: November 1962 to September 1964. EXTREMES: November 1962 to September 1965.--Water temperatures: Maximum, 59°F June 18, 1964; minimum, 41°F on many days during January to April 1963, February and March 1964. REMARKS.--No temperature record Oct. 7-30, Nov. 21 to Dec. 10, 1963, Dec. 13, 1963, Dec. 10, 1964, and Feb. 7-23, 1964, when clock stopped.

Temperature (°F) of water, November 1962 to September 1963  
(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	Average				
November																																			
53	53	53	53	53	53	52	52	52	53	53	53	52	52	51	51	52	52	51	51	51	51	51	50	50	50	50	50	49	49	--	52				
52	52	52	52	52	52	52	52	52	52	52	52	52	51	51	51	51	51	51	51	51	51	50	50	50	50	50	49	49	--	51					
December																																			
49	50	50	50	50	49	49	49	49	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	48					
49	49	50	50	50	49	49	49	49	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	45					
January																																			
45	46	45	45	45	45	45	45	45	45	45	45	45	45	44	44	44	44	44	44	43	43	42	42	42	42	41	41	41	41	44					
45	45	45	45	45	45	45	45	45	45	45	45	45	45	44	44	44	44	44	43	43	42	42	42	42	41	41	41	41	41	44					
February																																			
41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41				
41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41				
March																																			
41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41				
41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41				
April																																			
42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42				
41	41	41	41	41	41	41	41	42	41	42	41	42	42	42	42	42	42	43	43	44	42	42	42	42	42	42	42	42	42	42	42				
May																																			
46	46	47	46	47	47	47	47	47	46	47	46	46	46	46	47	47	48	48	47	47	47	47	48	48	48	48	48	49	47	47	47				
43	43	44	44	44	44	46	46	45	45	46	46	46	46	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47				
June																																			
47	48	49	49	49	49	48	48	47	48	49	50	50	50	50	50	50	50	49	49	49	49	49	49	49	49	49	49	50	50	50	49				
46	46	46	46	47	46	47	46	47	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46				
July																																			
50	54	50	50	50	50	50	48	48	48	48	48	50	49	49	50	50	50	50	50	50	52	49	49	50	51	51	50	50	50	50	50				
50	50	50	50	50	50	46	46	46	46	46	46	46	46	46	46	46	47	47	47	47	46	46	46	46	46	46	46	46	46	46	46				
August																																			
52	51	52	53	54	52	52	53	53	53	53	55	54	54	55	55	55	55	55	55	54	54	53	53	53	53	52	52	52	53	54	53				
48	48	47	48	48	48	48	48	48	48	48	49	49	49	49	51	51	51	51	51	51	54	54	50	50	50	49	48	51	49	52	54				
September																																			
54	54	55	55	55	55	55	55	55	55	55	54	54	54	54	54	54	54	54	54	54	54	54	53	52	52	52	52	52	53	53	53				
54	52	54	55	55	55	55	55	55	55	55	55	54	54	54	54	54	54	54	54	54	54	50	50	50	50	50	49	49	51	51	51				

KENTUCKY RIVER BASIN--Continued  
 3-2862. DIX RIVER AT DIX DAM, NEAR BURGIN, KY.--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964  
 (Continuous ethyl alcohol-actuated thermograph)

Month	Continuous 32-day period - started on 10/1/57																																Average
	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		
October	53	52	52	52	54	54																											
Maximum ....	50	49	50	50	50	50																										51	
Minimum ....	52	51	51	51	51	51	51	51	51	52	50	51	50	50	51	52	52	52	51	51												49	
November	52	51	52	51	51																												
Maximum ....	48	48	49	48	48		48	49	48	48	48	48	48	49	49	50	48	49	49	49													
Minimum ....																																5	
December																																	
Maximum ....																																	
Minimum ....																																	
January																																	
Maximum ....																																	
Minimum ....																																	
February																																	
Maximum ....	44	44	46	46	43	43																											
Minimum ....	44	44	44	43	43	43																											
March																																	
Maximum ....	41	41	41	41	41	41	42	42	42	42	42	42	42	42	42	42	42	42	43	43	43	43	43	43	43	43	43	43	43	44	44	42	
Minimum ....	41	41	41	41	41	41	41	41	41	42	42	42	42	42	42	42	42	42	43	43	43	43	43	43	43	43	43	43	43	43	44	44	
April																																	
Maximum ....	44	45	45	45	47	47	47	47	47	48	49	49	49	49	48	49	49	50	52	51	51	51	51	51	51	51	51	51	51	51	51	49	
Minimum ....	44	44	45	45	45	47	47	47	47	47	48	49	48	48	48	48	48	49	50	50	50	51	51	51	51	51	51	51	51	51	51	48	
May																																	
Maximum ....	52	53	54	54	54	54	54	54	54	54	55	55	55	55	54	54	54	54	55	55	54	55	56	56	56	55	57	56	56	55	55	55	
Minimum ....	51	52	53	54	54	54	54	54	54	54	54	54	54	53	53	53	54	54	54	53	53	54	55	55	55	55	55	55	55	55	55	54	
June																																	
Maximum ....	55	55	55	56	56	56	56	56	55	57	57	58	58	57	57	57	57	58	58	58	58	58	58	58	58	58	58	58	57	57	57	57	
Minimum ....	55	55	55	55	56	56	56	56	54	55	56	56	55	55	55	57	57	57	58	58	58	58	58	58	58	58	58	58	57	57	57	56	
July																																	
Maximum ....	57	57	56	56	56	56	55	55	55	54	53	54	54	54	53	52	52	51	52	51	50	51	50	52	50	49	50	50	50	52	52	53	
Minimum ....	57	56	56	56	56	55	55	55	55	53	53	53	53	53	52	51	51	50	51	49	50	50	49	50	49	48	49	50	51	52	52	52	
August																																	
Maximum ....	52	52	52	54	52	52	52	52	52	51	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	54	54	54	54	53	53	
Minimum ....	52	52	52	52	52	52	52	52	51	51	51	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	
September																																	
Maximum ....	54	54	54	54	54	54	54	53	53	52	53	53	53	53	53	52	52	52	52	52	52	52	52	52	52	52	52	53	53	54	53	53	
Minimum ....	53	53	53	53	53	53	53	53	52	52	52	52	52	52	52	51	52	52	51	51	52	52	52	52	52	52	52	51	52	52	51	52	

## KENTUCKY RIVER BASIN--Continued

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

LOCATION--At gaging station (on left bank) 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 1964.

Water temperatures: October 1949 to September 1964.

Sediment records: October 1952 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 464 micromhos Jan. 11; minimum daily, 137 micromhos Mar. 12.

Water temperatures: Maximum, 83°F July 22, Aug. 29, 30, Sept. 9, 10; minimum, 38°F Jan. 21, 22, Feb. 25.

Sediment concentrations: Maximum daily, 1,500 ppm Jan. 11; minimum daily, 380 ppm Jan. 11.

Water temperatures: Maximum daily, 83°F July 22, Aug. 29, 30, Sept. 9, 10; minimum, 38°F Jan. 21, 22, Feb. 25.

EXTREMES, 1949-64.--Specific conductance: Maximum daily, 573 micromhos Nov. 18, 1962; minimum daily, 71 micromhos Dec. 30, 1961.

Water temperatures: Maximum, 88°F July 22, 1957; minimum, freezing point on several days during January and February 1961.

Sediment concentrations (1952-64): Maximum daily, 2,430 ppm Jan. 31, 1956; minimum daily, 1 ppm on many days during 1952-56, 1964.

Sediment loads (1952-64): Maximum daily, 430,000 tons Feb. 28, 1962; minimum daily, 1 ton on many days during 1952-56, 1962, 1964.

REMARKS--Values reported for iron are in solution when analyzed. Daily samples were collected and records of specific conductance of daily samples available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, (3) maximum daily turbidity for each month, and (4) composite of all daily samples for each month. Flow partly regulated by Buckhorn Reservoir, Herrington. No temperature record Nov. 24 to Dec. 1, Dec. 14 to Jan. 20, Jan. 26 to Feb. 19.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color	Turbidity
														Calcium	Non-carbonate magnesium				
Oct. 9, 1963.....	546	6.3	0.21	---	---	---	---	98	29	30	---	---	184	109	28	306	6.9	3	---
Oct. 11, 1963.....	340	2.2	0.01	---	---	---	---	102	27	18	---	---	160	106	22	268	6.8	4	---
Oct. 29, 1963.....	431	---	---	---	---	---	---	---	---	---	---	---	165	---	---	293	---	---	---
Oct. 1-31, 1963.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Nov. 1, 1963.....	654	1.0	0.00	---	---	---	---	108	28	18	---	---	140	122	34	288	7.3	10	---
Nov. 5, 1963.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Nov. 28, 1963.....	785	0.9	0.00	---	---	---	---	108	25	12	---	---	138	115	26	261	6.7	5	15
Nov. 1-30, 1963.....	592	---	---	---	---	---	---	---	---	---	---	---	151	---	---	---	---	---	---
Dec. 3, 1963.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Dec. 27, 1963.....	728	2.6	0.01	---	---	---	---	114	20	8.0	---	---	131	117	24	251	6.6	5	4
Dec. 27-28, 1963.....	785	2.6	0.00	---	---	---	---	87	39	34	---	---	167	115	44	328	6.4	5	---
Dec. 1-23, 27-28, 1963.....	833	---	---	---	---	---	---	---	---	---	---	---	133	---	---	272	---	---	---
Jan. 11, 1964,.....	15800	5.0	0.01	---	---	---	---	78	50	75	---	---	236	132	68	464	6.2	3	---
Jan. 20, 1964,.....	---	---	---	---	---	---	---	45	27	12	---	---	---	---	---	---	---	---	---
Jan. 22, 1964,.....	11700	5.2	0.03	---	---	---	---	---	---	---	---	---	---	---	---	176	6.2	7	---
Jan. 3-31, 1964,.....	6262	---	---	---	---	---	---	---	---	---	---	---	147	---	---	278	---	---	---
Feb. 14, 1964,.....	9450	6.0	0.03	---	---	---	---	65	33	28	---	---	158	92	39	267	6.8	17	---
Feb. 28, 1964,.....	13600	5.6	0.07	---	---	---	---	50	24	8.0	---	---	94	62	21	160	6.7	7	---
Feb. 1-29, 1964,.....	8742	---	---	---	---	---	---	---	---	---	---	---	119	---	---	198	---	---	220

	7.2	.04		93	24	12	149	106	30	241	7.1	12
Mar. 5.....	62800	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Mar. 12.....	63400	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Mar. 19.....	64000	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Mar. 26.....	64600	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Mar. 31.....	65200	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Apr. 7.....	65800	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Apr. 13.....	66400	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Apr. 20.....	67000	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Apr. 27.....	67600	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
May 4.....	68200	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
May 11.....	68800	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
May 18.....	69400	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
May 25.....	70000	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
May 31.....	70600	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
June 7.....	71200	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
June 14.....	71800	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
June 21.....	72400	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
June 28.....	73000	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
July 5.....	73600	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
July 12.....	74200	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
July 19.....	74800	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
July 26.....	75400	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Aug. 2.....	76000	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Aug. 9.....	76600	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Aug. 16.....	77200	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Aug. 23.....	77800	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Aug. 30.....	78400	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Sept. 6.....	79000	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Sept. 13.....	79600	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Sept. 20.....	80200	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Sept. 27.....	80800	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Oct. 4.....	81400	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Oct. 11.....	82000	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Oct. 18.....	82600	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Oct. 25.....	83200	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Nov. 1.....	83800	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Nov. 8.....	84400	5.7	.08	51	17	7.0	86	64	22	137	7.2	20
Nov. 15.....	850											



## KENTUCKY RIVER BASIN--Continued

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

Temperature (°F) of water, water year October 1963 to September 1964  
(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	68	68	69	69	68	68	69	68	69	68	67	67	67	67	67	66	66	65	65	66	66	66	65	65	65	65	66	65	64	63	61	66
Maximum	66	67	67	68	67	67	66	67	66	66	66	66	66	66	65	65	65	64	64	64	64	64	64	64	64	64	64	65	64	63	61	65
Minimum	61	60	59	58	57	57	57	57	56	55	55	54	54	53	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
November	60	59	58	57	57	57	56	55	55	54	54	53	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Maximum	61	60	59	58	57	57	56	55	55	54	54	53	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Minimum	--	48	48	47	47	46	46	45	45	44	44	44	44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	--	48	47	47	46	46	45	45	44	44	44	44	44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	37	38	38	42	43	44	43	44	45	45	45	45	45	45	45	45	45	45	45	45	45	44	44	44	45	45	45	45	45	44	44	43
Minimum	37	37	38	38	42	43	43	44	45	45	45	45	45	45	45	45	45	45	45	45	45	44	44	44	45	45	45	45	45	44	44	43
April	44	44	45	45	45	47	48	48	48	49	50	50	51	52	53	53	54	55	55	56	57	57	57	57	58	58	58	58	58	58	58	52
Maximum	44	44	45	45	45	47	48	48	48	49	50	50	51	52	53	53	54	55	55	56	57	57	57	57	58	58	58	58	58	58	58	52
Minimum	44	44	44	45	45	45	47	47	47	48	49	50	50	51	52	53	54	55	55	56	57	57	57	58	58	58	58	58	58	58	58	51
May	59	59	61	61	63	63	64	64	64	64	64	65	65	65	66	67	68	70	70	73	73	73	73	72	73	73	73	73	69	68	67	65
Maximum	59	59	61	61	63	63	64	64	64	64	64	65	65	65	66	67	68	67	68	69	69	70	71	71	71	71	71	69	67	67	67	65
Minimum	58	59	59	59	61	61	63	63	64	64	64	65	65	65	66	67	68	67	68	69	69	70	71	71	71	71	71	69	67	67	67	65
June	68	68	69	69	69	69	71	73	73	73	74	75	75	75	75	75	75	75	77	77	77	79	79	79	78	79	81	80	79	79	79	75
Maximum	67	67	66	67	67	67	68	69	70	71	72	72	73	73	74	73	73	74	73	75	75	75	75	77	77	77	76	75	74	77	77	75
Minimum	67	67	66	67	67	67	68	69	70	71	72	72	73	73	74	73	73	74	73	75	75	75	75	77	77	77	76	75	74	77	77	75
July	78	79	79	79	77	76	75	77	79	78	77	76	75	75	76	76	76	78	80	83	79	82	79	78	80	79	79	79	79	79	79	78
Maximum	76	75	77	77	75	75	74	75	75	76	75	74	75	75	75	75	75	76	76	78	78	77	77	77	77	77	77	77	77	77	77	76
Minimum	76	75	77	77	75	75	74	75	75	76	75	74	75	75	75	75	75	76	76	78	78	77	77	77	77	77	77	77	77	77	77	76
August	79	80	81	82	81	81	79	79	78	77	77	74	73	72	73	72	73	72	73	73	73	73	73	73	73	73	73	73	73	82	77	73
Maximum	76	78	79	80	79	79	78	78	76	75	74	72	72	71	71	71	71	72	71	72	72	72	72	72	72	72	72	72	72	78	78	79
Minimum	76	78	79	80	79	79	78	78	76	75	74	72	72	71	71	71	71	72	71	72	72	72	72	72	72	72	72	72	72	78	78	79
September	81	81	79	80	79	80	81	83	83	77	76	74	73	73	73	72	72	71	73	74	73	72	71	70	69	69	69	66	66	66	66	75
Maximum	77	77	77	78	76	77	77	76	76	74	73	72	71	71	71	72	71	72	71	72	72	72	72	72	72	70	68	66	66	66	66	73
Minimum	77	77	77	78	76	77	77	76	76	74	73	72	71	71	71	72	71	72	71	72	72	72	72	72	72	70	68	66	66	66	66	73

## KENTUCKY RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964  
(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	--	11	654	4	7	445	2	2
2..	600	--	11	445	4	5	766	2	4
3..	600	--	11	458	4	5	980	3	8
4..	600	--	11	370	4	4	1850	3	15
5..	600	--	11	497	4	5	1080	4	12
6..	340	6	6	728	5	10	546	4	6
7..	240	7	4	432	5	6	940	4	10
8..	528	7	10	654	5	9	842	4	9
9..	546	8	12	823	6	13	728	4	8
10..	340	8	7	600	6	10	804	4	9
11..	564	9	14	380	6	6	564	5	8
12..	672	10	18	618	6	10	654	4	7
13..	376	10	10	709	5	10	618	4	7
14..	256	10	7	920	4	10	690	4	7
15..	393	10	11	842	4	9	380	3	3
16..	290	10	8	330	4	4	980	4	10
17..	497	10	13	186	3	2	1940	5	26
18..	290	9	7	346	3	3	1210	5	16
19..	248	9	6	1110	3	9	785	5	10
20..	290	9	7	823	3	7	690	5	9
21..	484	8	10	636	4	7	880	5	12
22..	471	7	9	458	4	5	510	5	7
23..	636	6	10	484	5	6	510	5	7
24..	471	5	6	380	4	4	445	5	6
25..	497	5	7	445	3	4	280	5	4
26..	432	4	5	280	3	2	380	5	5
27..	350	4	4	600	2	3	785	5	10
28..	360	4	4	785	2	4	330	5	4
29..	350	5	5	690	2	4	200	5	3
30..	600	4	6	1080	3	9	240	5	3
31..	458	3	4	--	--	--	380	5	5
Total	13979	--	265	17763	--	192	22432	--	252
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..	445	5	6	2440	73	481	4050	--	750
2..	445	5	6	2270	66	404	4250	--	650
3..	600	5	8	2270	65	398	7930	--	1500
4..	690	5	9	2620	65	460	33300	800	A 72000
5..	1480	5	20	2270	65	398	62800	1500	A 250000
6..	1940	8	42	3000	63	510	55700	1070	161000
7..	2810	18	136	3800	61	626	41700	828	93000
8..	4420	36	430	7480	58	1170	32600	470	41400
9..	10400	66	1850	9840	56	1490	55900	478	72100
10..	13000	121	4250	8880	48	1150	76100	500	103000
11..	15800	178	7590	7480	35	707	76800	491	102000
12..	15400	200	8320	6140	29	481	63400	478	81800
13..	10400	167	4690	6600	22	392	37500	442	44800
14..	7430	122	2450	9450	47	1200	20100	384	20800
15..	5070	96	1310	12600	74	2520	16800	250	11300
16..	3690	82	817	17300	96	4480	23900	204	13200
17..	2620	70	495	20300	172	9430	28200	173	13200
18..	2100	56	318	21600	244	14200	24200	130	8690
19..	1780	36	173	18900	238	12100	18300	112	5530
20..	4050	64	700	15100	168	6850	14700	97	3850
21..	8080	156	3400	13600	141	5180	14400	87	3380
22..	11700	175	5530	12400	143	4790	15700	87	3690
23..	13200	208	7410	10500	145	4110	16400	80	3540
24..	10100	155	4230	8700	151	3550	16100	66	2870
25..	7300	132	2600	7250	141	2760	14900	52	2090
26..	5670	112	1710	6160	100	1660	13500	50	1820
27..	5360	108	1560	5480	76	1120	12400	46	1540
28..	5490	101	1500	4720	--	900	11200	36	1090
29..	4420	94	1120	4380	--	850	10600	35	1000
30..	3600	87	846	--	--	--	9890	35	935
31..	3000	81	656	--	--	--	8300	35	784
Total	182490	--	64182	253530	--	84367	841620	--	1123109

A Computed from partly estimated-concentration graph.

## KENTUCKY RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..	6800	28	514	9980	38	1020	1160	23	72
2..	6100	27	445	8930	41	988	1130	22	67
3..	5190	30	420	7700	48	998	1180	22	70
4..	5490	28	415	6050	46	751	1130	22	67
5..	7300	22	434	5020	39	529	1720	20	93
6..	11200	31	937	4130	36	401	1720	17	79
7..	14000	39	1470	3320	35	314	1370	14	52
8..	10900	40	1180	2660	35	251	1130	13	40
9..	11300	35	1070	2270	36	221	1080	14	41
10..	13400	66	2390	2140	36	208	1000	15	40
11..	12700	89	3050	1880	36	183	920	14	35
12..	9410	176	4470	1510	33	134	880	12	28
13..	7430	309	6200	1540	29	120	900	11	27
14..	6620	--	3700	1690	24	110	1370	10	37
15..	6100	--	2300	1540	21	87	1080	10	29
16..	6360	--	1700	1630	17	75	861	11	26
17..	5830	--	1200	1540	14	58	880	12	28
18..	5100	--	1000	1400	14	53	1130	12	37
19..	5150	--	950	1480	13	52	1370	12	44
20..	10800	--	2300	1510	13	53	1460	13	51
21..	20900	117	6600	510	13	18	1480	14	56
22..	20100	134	7270	393	13	14	1340	14	51
23..	15000	137	5550	823	13	29	1040	14	39
24..	10900	153	4500	823	13	29	1400	13	49
25..	8640	92	2150	785	13	28	880	12	28
26..	7380	67	1340	842	13	30	380	11	11
27..	7160	54	1040	1130	14	43	445	10	12
28..	7700	49	1020	1510	15	61	600	9	14
29..	8210	49	1090	1660	16	72	637	9	15
30..	9460	43	1100	1780	19	91	672	9	16
31..	--	--	--	1180	22	70	--	--	--
Total	282630	--	67805	79356	--	7091	32345	--	1254
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..	940	9	23	497	5	7	380	8	8
2..	360	10	10	600	5	8	393	8	8
3..	747	10	20	747	6	12	340	7	6
4..	280	10	8	654	8	14	300	5	4
5..	248	10	7	528	10	14	290	3	2
6..	214	10	6	880	12	28	340	2	2
7..	431	11	13	2620	12	85	240	2	1
8..	1290	12	42	2810	13	99	280	2	2
9..	1600	12	52	1110	14	42	300	3	2
10..	618	12	20	1180	13	41	300	3	2
11..	728	12	24	1130	12	37	290	3	2
12..	823	12	27	808	12	26	272	2	1
13..	920	12	30	618	11	18	248	2	1
14..	1630	11	48	380	10	10	248	1	1
15..	2300	10	62	600	9	14	240	2	1
16..	2270	10	61	600	8	13	240	3	1
17..	1690	9	41	940	8	20	256	3	2
18..	1080	8	23	1100	8	24	320	3	2
19..	1000	8	22	1000	8	22	310	3	2
20..	900	11	27	393	8	8	264	2	1
21..	860	12	28	618	7	12	290	3	2
22..	690	11	20	564	8	12	340	3	3
23..	1430	10	39	458	9	11	320	4	3
24..	690	9	17	510	8	11	256	5	3
25..	1080	8	23	810	8	17	240	5	3
26..	980	7	18	1870	7	35	232	5	3
27..	823	7	16	433	8	9	280	5	4
28..	564	6	9	250	8	5	960	6	16
29..	510	6	8	220	6	4	1630	20	88
30..	766	6	12	220	5	3	1240	23	77
31..	582	5	8	300	3	2	--	--	--
Total	29044	--	764	25448	--	663	11639	--	253
Total discharge for year (cfs-days).....								1792276	
Total load for year (tons).....								1350197	

## KENTUCKY RIVER BASIN--Continued

## 3-2915. EAGLE CREEK AT GLENCOE, KY.

LOCATION (revised).--At gaging station, 600 feet upstream from bridge on State Highway 127, 0.6 mile south of Glencoe, Gallatin County, 5.8 miles downstream from Temble Creek, and 22 miles upstream from mouth.

DRAINAGE AREA.--437 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1949 to September 1964.

Sediment loads: November 1961 to September 1964.

EXTREMES 1961-64: Maximum temperature, 87°F Aug. 3, 4; minimum, freezing point on many days during December to February. Sediment concentrations: Maximum daily, 3,390 ppm Mar. 4; minimum daily, no flow on many days during October, August, and September.

Sediment loads: Maximum daily, 231,000 tons Mar. 5; minimum daily, 0 tons on many days during October, August, and September. EXTREMES, 1949-64.--Water temperatures: Maximum, 93°F Sept. 1, 2, 1963; minimum, freezing point on many days during winter months. Sediment concentrations (1961-64): Maximum daily, 3,390 ppm Mar. 4, 1964; minimum daily, no flow on many days during October 1963, August and September 1964.

Sediment loads (1961-64): Maximum daily, 231,000 tons Mar. 5, 1964; minimum daily, 0 tons on many days during October 1963, August and September 1964.

REMARKS.--Flow affected by ice Dec. 28-31, Jan. 1-4, 15-18. Sediment samples are collected at bridge on U.S. Highway 127, 600 feet downstream from gage.

Temperature (°F) of water, water year October 1963 to September 1964  
(Twice-daily measurements at approximately 0700 and 2000)

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	55	55	57	--	56	58	58	58	56	57	57	57	57	56	57	57	56	56	55	57	58	58	58	58	59	58	59	59	56	53	51	57
a.m.	62	62	61	61	62	63	62	62	63	63	62	63	63	63	63	63	61	62	63	63	63	63	62	62	62	64	59	56	59	55	62	
p.m.	52	47	44	44	47	48	48	47	46	48	46	45	44	44	43	43	46	50	--	--	49	50	50	44	40	43	43	40	40	--	46	
November	53	50	48	48	48	51	51	52	50	50	46	45	45	46	46	50	50	49	53	51	54	48	45	43	45	45	45	41	42	--	48	
a.m.	39	38	38	--	38	38	37	39	37	36	36	36	--	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	
p.m.	39	39	39	38	39	39	40	38	37	37	37	36	36	34	32	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	35	
December	32	32	33	33	33	32	--	33	33	33	33	33	32	32	32	32	--	32	32	32	32	--	34	34	34	34	33	32	--	33	33	
a.m.	32	32	33	33	33	33	33	33	33	33	33	33	32	32	32	32	--	32	32	33	34	35	35	34	36	36	35	34	34	35	--	33
p.m.	34	34	32	32	32	33	35	33	34	36	32	32	33	33	--	--	--	35	35	35	34	32	32	32	34	36	35	34	33	--	33	
January	37	37	34	33	36	37	36	36	37	36	35	32	35	37	37	37	37	38	38	37	37	37	35	36	37	36	36	36	37	--	36	
a.m.	34	35	--	45	47	47	46	--	49	48	48	47	48	--	48	--	50	45	43	44	--	44	44	46	50	--	47	47	48	46	40	45
p.m.	38	39	45	47	47	48	49	48	50	48	48	48	48	48	--	50	50	50	48	45	--	44	47	48	50	54	50	49	48	48	42	41

KENTUCKY RIVER BASIN--Continued  
3-2915. EAGLE CREEK AT GLENCOE, KY.--Continued

Temperature (°F) of water, water year October 1963 to September 1964--Continued

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
April																																
a.m.....	40	45	50	47	48	50	55	56	50	54	56	56	56	56	57	58	60	64	--	62	63	--	64	63	64	65	65	65	63	60	--	57
p.m.....	46	50	50	50	50	57	60	56	56	57	58	58	59	60	60	62	64	67	--	65	65	65	68	68	67	65	67	66	65	--	--	60
May																																
a.m.....	59	62	65	65	66	67	68	69	70	71	69	69	68	65	66	65	68	69	71	75	72	73	74	--	75	73	75	--	65	64	63	68
p.m.....	63	65	69	70	71	71	73	73	72	74	--	--	70	71	70	71	74	75	78	75	76	77	78	80	75	78	--	67	66	65	72	72
June																																
a.m.....	65	65	64	63	67	74	75	76	76	78	77	76	77	78	78	74	70	71	78	76	76	77	79	--	76	75	74	70	77	79	--	74
p.m.....	68	67	67	68	--	77	78	79	80	81	80	81	81	82	--	75	76	80	80	80	80	80	--	79	80	80	81	82	82	82	--	78
July																																
a.m.....	76	77	76	77	76	75	74	73	72	72	73	75	72	71	73	74	77	78	78	79	79	79	80	81	81	81	81	82	81	80	77	77
p.m.....	81	82	81	80	79	77	77	--	77	79	76	75	76	77	80	81	83	83	83	83	83	84	82	84	84	84	84	83	84	85	81	81
August																																
a.m.....	80	80	81	83	83	80	80	79	77	75	77	75	70	70	70	69	70	71	72	71	--	75	70	71	71	72	74	75	75	76	78	75
p.m.....	84	85	87	87	85	83	82	82	80	81	80	76	73	72	73	72	75	76	76	--	77	78	75	76	75	76	77	78	80	81	79	75
September																																
a.m.....	76	--	73	72	70	71	72	72	71	72	73	73	67	64	62	67	68	69	68	70	70	72	71	68	62	63	62	61	62	62	--	68
p.m.....	--	76	76	75	73	75	75	76	75	77	78	73	69	68	68	71	72	73	70	73	74	75	73	68	67	66	64	62	64	65	--	71

## KENTUCKY RIVER BASIN--Continued

## 3-2915. EAGLE CREEK AT GLENCOE, KY.--Continued

Suspended sediment, water year October 1963 to September 1964  
(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..	0.2	46	T	0.6	30	T	0.9	5	T
2..	.2	42	T	.4	30	T	.9	7	T
3..	0	0	0	.4	25	T	.9	7	T
4..	0	0	0	.4	19	T	.8	9	T
5..	0	0	0	.4	17	T	.8	7	T
6..	0	0	0	.2	17	T	.8	6	T
7..	0	0	0	.2	24	T	.7	5	T
8..	0	0	0	.2	22	T	.7	10	T
9..	0	0	0	.1	18	T	.7	15	T
10..	0	0	0	.3	20	T	.7	8	T
11..	0	0	0	1.6	21	T	.7	8	T
12..	0	0	0	1.8	22	T	.7	5	T
13..	0	0	0	1.8	17	T	.7	3	T
14..	0	0	0	1.8	12	T	.6	2	T
15..	0	0	0	1.6	14	T	.5	5	T
16..	0	0	0	1.4	14	T	.5	6	T
17..	0	0	0	1.3	15	T	.5	5	T
18..	0	0	0	1.2	13	T	.5	2	T
19..	0	0	0	1.0	16	T	.5	3	T
20..	0	0	0	1.0	17	T	.5	2	T
21..	0	0	0	.9	10	T	.5	2	T
22..	0	0	0	.8	10	T	.5	4	T
23..	0	0	0	.9	17	T	.5	5	T
24..	0	0	0	.9	16	T	.5	--	T
25..	0	0	0	.9	12	T	.4	--	T
26..	0	0	0	.8	11	T	.4	--	T
27..	0	0	0	.8	9	T	.4	--	T
28..	0	0	0	.8	9	T	.4	--	T
29..	.4	20	T	.8	9	T	.4	--	T
30..	.5	20	T	.9	7	T	.4	--	T
31..	.6	21	T	--	--	--	.4	--	T
Total	1.9	--	<1	26.2	--	1	18.4	--	<1
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..	0.4	4	T	47	27	3	50	26	4
2..	.4	4	T	41	26	3	48	36	5
3..	1.0	5	T	36	28	3	196	232	S 442
4..	6.0	5	T	35	26	2	17500	3390	S 160000
5..	59	3	T	33	20	2	32000	2290	S 231000
6..	135	16	6	1460	438	S 3550	7370	801	S 19000
7..	921	115	286	1090	555	S 4980	894	485	S 10700
8..	582	86	135	949	264	676	2630	901	S 8040
9..	725	--	2000	311	175	147	29000	1720	S 135000
10..	1900	985	5050	163	107	47	39300	1240	S 141000
11..	1070	206	S 666	105	76	22	8440	620	S 14100
12..	275	101	75	91	52	13	1290	309	S 1140
13..	105	94	27	81	42	9	737	100	S 199
14..	81	72	16	85	40	9	2160	--	S 6700
15..	60	36	6	288	40	S 28	3610	950	A 9300
16..	54	15	2	2350	248	1570	1670	478	S 6160
17..	40	11	1	1690	185	844	739	225	S 449
18..	35	9	1	725	128	250	426	150	S 172
19..	69	144	27	484	68	89	270	125	S 91
20..	2450	1400	A 9300	491	64	85	220	76	S 45
21..	3470	832	7800	368	50	50	1450	170	S 988
22..	893	424	S 1090	202	45	24	1930	295	S 1640
23..	420	192	218	132	42	15	725	191	S 374
24..	242	172	112	105	40	11	400	135	S 146
25..	562	136	206	85	39	9	287	100	S 77
26..	753	109	222	77	36	7	4410	2150	S 29200
27..	293	80	63	65	32	6	1970	1270	S 8010
28..	114	56	17	58	32	5	614	580	S 962
29..	75	49	10	56	31	5	361	293	S 286
30..	59	37	6	--	--	--	248	192	S 128
31..	53	30	4	--	--	--	155	124	S 52
Total	15502.8	--	27347	13703	--	12464	161100	--	775780

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed from partly estimated-concentration graph.

## KENTUCKY RIVER BASIN--Continued

3-2915. EAGLE CREEK AT GLENCOE, KY.--Continued

Suspended sediment, water year October 1963 to September 1964--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..	129	101	35	562	50	76	7.8	41	1
2..	108	104	30	368	40	40	7.0	37	1
3..	558	239	S 484	236	49	31	7.0	37	1
4..	310	192	S 177	163	50	22	9.0	26	1
5..	139	98	37	126	26	9	15	23	1
6..	963	101	263	103	23	6	11	10	T
7..	484	128	167	89	16	4	10	10	T
8..	368	76	76	83	16	4	10	12	T
9..	216	41	24	77	16	3	9.0	12	T
10..	139	39	15	67	24	4	8.6	13	T
11..	108	32	9	62	51	8	6.7	15	T
12..	91	38	9	108	65	19	6.1	16	T
13..	247	60	S 49	91	58	14	6.1	16	T
14..	484	83	108	67	32	6	9.0	16	T
15..	491	50	66	58	37	6	1490	796	S 3440
16..	216	31	18	47	32	4	275	668	S 636
17..	123	28	9	38	32	3	71	380	73
18..	103	22	6	30	36	3	3880	1460	S 30900
19..	662	--	1700	25	34	2	3410	1460	13400
20..	1880	550	A 2900	23	36	2	1000	390	1050
21..	1090	352	1040	18	55	3	356	240	231
22..	774	186	389	15	46	2	155	203	85
23..	712	84	161	15	51	2	117	180	57
24..	640	105	181	19	68	3	99	117	31
25..	458	92	114	17	50	2	69	106	20
26..	293	42	33	13	50	2	34	66	6
27..	1860	167	S 1010	11	51	2	23	42	3
28..	2660	377	2780	10	49	1	21	45	2
29..	1330	184	660	9.0	46	1	16	37	2
30..	1170	77	243	9.4	45	1	13	38	1
31..	--	--	--	8.6	44	1	--	--	--
Total	18806	--	12793	2568.0	--	286	11151.3	--	49945
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..	13	41	1	1.5	21	T	0.4	48	T
2..	9.8	37	1	1.1	22	T	.3	50	T
3..	8.2	44	1	1.0	23	T	.2	51	T
4..	6.4	45	1	.8	40	T	.1	56	T
5..	6.4	45	1	.7	42	T	.1	58	T
6..	5.5	45	1	.6	42	T	0	0	0
7..	6.4	48	1	.6	45	T	0	0	0
8..	833	--	1000	.6	47	T	0	0	0
9..	439	164	194	.6	48	T	0	0	0
10..	536	106	153	.4	48	T	0	0	0
11..	287	107	83	.3	50	T	0	0	0
12..	167	90	40	.3	56	T	0	0	0
13..	117	100	32	.3	52	T	0	0	0
14..	287	125	97	.2	42	T	0	0	0
15..	155	112	47	.2	40	T	0	0	0
16..	79	65	14	.2	40	T	0	0	0
17..	46	56	7	.2	39	T	0	0	0
18..	29	35	3	.1	43	T	0	0	0
19..	21	33	2	0	0	0	0	0	0
20..	15	27	1	0	0	0	0	0	0
21..	12	32	1	0	0	0	0	0	0
22..	9.0	34	1	.1	41	T	0	0	0
23..	8.6	30	1	.2	55	T	0	0	0
24..	9.0	30	1	.2	50	T	0	0	0
25..	7.0	31	1	.2	42	T	0	0	0
26..	4.9	35	T	.2	40	T	0	0	0
27..	3.8	38	T	.4	32	T	0	0	0
28..	3.6	34	T	.4	31	T	0	0	0
29..	4.0	32	T	.4	36	T	0	0	0
30..	3.6	33	T	.4	36	T	0	0	0
31..	2.0	20	T	.4	34	T	--	--	--
Total	3134.2	--	1687	12.6	--	1	1.1	--	<1

Total discharge for year (cfs-days)..... 226025.5  
 Total load for year (tons)..... 880307

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed from partly estimated-concentration graph.

## KENTUCKY RIVER BASIN--Continued

3-2915. EAGLE CREEK AT GLENCOE, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964

(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;

F, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (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	
Jan. 20, 1964.....	0800			258	1310		68	76	89	94	98	99	99	100			SEWC
Jan. 20.....	0800			258	1310		30	39	66	90	96	97	99	100			SEN
Feb. 7.....	0830			3780	576		64	72	84	92	98	99	100	--			SEWC
Mar. 5.....	0730			34900	3020		49	59	74	87	97	99	100	--			SEWC
Mar. 5.....	1500			28000	1860		55	64	66	85	96	99	100	--			SEWC
Mar. 5.....	1800			28000	1860		35	46	64	78	97	98	99	100			SEN
June 18.....	2200			11900	3770		44	53	67	82	97	99	100	--			SEWC







## GREEN RIVER BASIN--Continued

3-3064.9. GREEN RIVER NEAR GREENSBURG, KY.

LOCATION--At auxiliary gaging station at Sardins Ford bridge on State 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 1964.

REMARKS.--Records of discharge are given for Green River at Greensburg.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (at 180°C)	Hardness as CaCO <sub>3</sub>		Toxicity (micro-invertebrates at 25°C)	pH	Color or turbidity		
																			Calcium, mg/l	Non-carbonate, mg/l					
Oct. 15, 1963 <sup>A</sup>	3.0	4.6		0.18	0.16	26	8.2	4.0	2.1		110		14		6.0	0.1	0.5		124	98	8	230	7.1	5	7
Nov. 19.....	12	5.5		.16	--	--	--	--	--	--	115		15		6.0	--	--		134	104	10	222	7.3	3	6
Dec. 17.....	57	7.2		.20	--	--	--	--	--	--	117		15		6.0	--	--		132	97	1	210	6.4	6	85
Jan. 22, 1964	1850	5.4		.32	--	--	--	--	--	--	48		18		4.0	--	--		86	59	20	143	6.9	10	85
Feb. 18.....	1800	5.5		.11	--	--	--	--	--	--	32		16		3.0	--	--		102	38	16	158	6.7	10	43
Mar. 17.....	3250	6.3		.10	--	--	--	--	--	--	46		11		3.0	--	--		76	48	10	113	6.4	23	60
Apr. 21.....	1780	10		--	--	--	--	--	--	--	52		20		4.0	--	--		84	56	14	126	7.3	37	110
May 22.....	130	5.5		--	--	--	--	--	--	--	78		15		5.0	--	--		96	77	13	171	7.4	10	15
June 16.....	853	7.6		--	--	--	--	--	--	--	56		12		4.0	--	--		83	60	14	133	7.3	27	600
July 21.....	76	7.9		--	--	--	--	--	--	--	80		13		4.0	--	--		115	77	12	170	7.4	17	50
Sept. 1.....	16	7.0		--	--	--	--	--	--	--	92		11		5.0	--	--		115	88	12	199	7.4	10	25
Sept. 29.....	142	5.9		.16	.13	27	4.5	4.3	2.9		84		19		7.0	.2	1.8		127	86	17	205	7.3	37	--

A Sample for this date includes the following: Phenols (as C<sub>6</sub>H<sub>5</sub>OH), 0.004 ppm, dissolved oxygen 7.4 ppm and 76 percent saturation, and threshold odor of 0.

A Sample for this date includes the following: Phenols (as C<sub>6</sub>H<sub>5</sub>OH), 0.004 ppm, dissolved oxygen 7.4 ppm and 76 percent saturation, and threshold odor of 0

## 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 September 1964. No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Calcium sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or Col.
																	Calcium, magnesium	Non-carbonate		
Oct. 16, 1963 <sup>A</sup>		5.5		0.20	0.07	80	24	106	2.8	190	94	195	0.1	1.4		608	298	14	1120	7.1
Nov. 17.....		---	---	---	---	---	---	---	---	---	---	288	---	---	---	820	---	---	1380	---
Dec. 17.....		---	---	---	---	---	---	---	---	---	---	350	---	---	---	972	---	---	1600	---
Jan. 22, 1964		---	---	---	---	---	---	---	---	---	---	38	---	---	---	216	---	---	368	---
Feb. 12.....		---	---	---	---	---	---	---	---	---	---	33	---	---	---	218	---	---	383	---
Mar. 17.....		---	---	---	---	---	---	---	---	---	---	19	---	---	---	176	---	---	289	---
Apr. 21.....		---	---	---	---	---	---	---	---	---	---	17	---	---	---	186	---	---	325	---
May 22.....		---	---	---	---	---	---	---	---	---	---	83	---	---	---	330	---	---	607	---
June 16.....		---	---	---	---	---	---	---	---	---	---	48	---	---	---	245	---	---	423	---
July 21.....		---	---	---	---	---	---	---	---	---	---	74	---	---	---	278	---	---	512	---
Sept. 1.....		---	---	---	---	---	---	---	---	---	---	57	---	---	---	318	---	---	549	---
Sept. 29.....		4.4		.14	.59	45	8.4	63	2.9	108	26	122	.2	1.5		338	147	58	630	7.8

<sup>A</sup> Analysis for this date includes 0.004 ppm phenols (as C<sub>6</sub>H<sub>5</sub>OH), 5.2 ppm dissolved oxygen (percent saturation - 50), 20 ppm turbidity, and threshold odor - M-1.

GREEN RIVER BASIN--Continued  
3--3085. GREEN RIVER AT MUMFORDVILLE, KY.

LOCATION.--At gaging station (on right bank) at bridge on U.S. Highway 31W at Mumfordsville, 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 1964.

Water temperatures: October 1950 to September 1964.

Sediment records: April 1951 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 1,540 micromhos Nov. 17; minimum daily, 111 micromhos Mar. 12.  
Water temperatures: Maximum, 79°F June 22, 23; minimum, freezing point several days during December to February.

Sediment concentrations: Maximum daily, 1,700 ppm May 27; minimum daily, 1 ppm on many days during October, December, and February.

EXTREMES, 1950-64.--Specific conductance: Maximum daily, 1,300 micromhos Oct. 10, 1949; minimum daily, 59 micromhos Mar. 25, 1952.

Water temperatures: Maximum, 82°F July 20, 1957; minimum, freezing point on many days during winter months from 1957 to 1964.

Sediment concentrations (1951-64): Maximum daily, 3,180 ppm June 14, 1952; minimum daily, 1 ppm on many days during 1952-57, 1960-64.

Sediment loads (1951-64): Maximum daily, 157,000 tons Mar. 1, 1962; minimum daily, less than 0.50 ton on many days during 1953-56, 1961-64.

REMARKS.--Values reported for iron are in solution when analyzed. Samples were collected daily and records of daily specific conductance and chloride are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, (3) maximum daily turbidity for each month, and (4) composite of all daily samples for the month. Flow affected by ice Jan. 18-19.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color	Turbidity
														Calcium	Non-magnesium				
Oct. 5, 1963.....	82	6.6	0.00	--	--	--	--	184	18	95	--	--	336	189	38	620	7.4	4	--
Oct. 11.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--
Oct. 13.....	85	9.2	.00	--	--	--	--	185	18	84	--	--	312	186	34	581	7.2	2	--
Oct. 1-31.....	85.4	--	--	--	--	--	--	--	--	84	--	--	337	--	--	604	--	--	--
Nov. 2.....	100	7.8	.02	--	--	--	--	178	17	86	--	--	293	194	48	590	6.9	5	--
Nov. 17.....	118	9.9	.01	--	--	--	--	180	24	380	--	--	829	300	152	1540	7.3	5	--
Nov. 1-30.....	125	--	--	--	--	--	--	--	--	180	--	--	486	--	--	919	--	--	--
Dec. 7.....	166	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1360	--	--	9
Dec. 9.....	130	5.1	.01	--	--	--	--	138	22	108	--	--	304	170	57	623	6.8	3	--
Dec. 26.....	163	--	--	--	--	--	--	--	--	140	--	--	421	--	--	817	--	--	--
Dec. 1-31.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 7, 1964.....	986	9.6	.00	--	--	--	--	148	45	305	--	--	724	258	137	1290	7.3	8	--
Jan. 21.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	550
Jan. 23.....	2660	5.9	.04	--	--	--	--	68	20	23	--	--	132	82	26	236	7.3	22	--
Jan. 1-31.....	1342	--	--	--	--	--	--	--	--	81	--	--	264	--	--	488	--	--	--
Feb. 9.....	1030	6.1	.01	--	--	--	--	117	27	90	--	--	292	150	54	539	7.1	5	--
Feb. 16.....	4030	6.7	.03	--	--	--	--	74	20	21	--	--	132	84	24	239	7.0	10	120
Feb. 1-29.....	1755	--	--	--	--	--	--	--	--	51	--	--	199	--	--	363	--	--	--

Mar. 3.....	1270	6.3	.01	111	22	53	216	125	34	394	7.4	6	--
Mar. 5.....	40700	7.4	.11	48	10	5.0	88	45	6	111	6.8	45	1400
Mar. 12.....	11190	--	--	--	--	25	150	--	--	246	--	--	--
Mar. 1-31.....	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 5, 1964.....	2160	11	0.01	114	22	53	--	--	46	396	8.3	0	600
Apr. 21.....	5580	14	.03	84	14	12	136	89	20	199	8.1	0	--
Apr. 30.....	2658	--	--	--	--	30	172	--	--	293	--	--	--
Apr. 1-30.....	--	--	--	--	--	--	--	--	--	--	--	--	--
May 2.....	3620	8.3	.04	86	16	16	--	93	22	220	8.1	5	--
May 25.....	350	5.6	.02	141	19	78	281	174	56	517	8.2	5	--
May 26.....	--	--	--	--	--	--	--	--	--	--	--	--	3600
May 1-31.....	1306	--	--	--	--	48	219	--	--	378	--	--	--
June 13.....	2560	5.4	.01	A <sub>148</sub>	19	103	335	190	68	601	8.3	5	--
June 14.....	--	--	--	--	--	--	--	--	--	--	--	--	4800
June 16.....	2620	8.1	.02	91	16	24	152	102	28	269	8.0	5	--
June 1-30.....	942	--	--	--	--	64	257	--	--	435	--	--	--
July 14.....	1320	7.5	.05	105	16	36	146	111	25	325	7.9	5	700
July 24.....	274	7.4	.13	130	16	174	406	182	76	805	8.0	3	--
July 1-31.....	564	--	--	--	--	81	266	--	--	496	--	--	--
Aug. 23.....	--	--	--	--	--	--	--	--	--	--	--	--	1200
Aug. 24.....	1080	8.2	.01	96	106	249	568	182	104	989	7.5	5	--
Aug. 26.....	559	9.0	.01	112	15	50	218	121	29	376	8.0	10	--
Aug. 1-31.....	357	--	--	--	--	106	340	--	--	591	--	10	--
Sept. 1.....	175	10	.02	136	16	67	248	162	50	468	7.8	5	--
Sept. 30.....	1720	12	.05	106	24	150	360	135	68	596	7.6	10	450
Sept. 1-30.....	199	--	--	160	--	--	325	--	--	559	7.9	--	--

A Includes 2 ppm carbonate (CO<sub>3</sub>).

## GREEN RIVER BASIN--Continued

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

Specific conductance and chloride, in parts per million,  
water year October 1963 to September 1964

Day	October		November		December		January	
	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)
1	601	90	592	85	958	202	701	132
2	595	90	590	86	1060	233	749	143
3	604	92	595	86	1150	258	763	149
4	616	96	607	90	1190	270	935	192
5	620	95	623	92	1040	224	1160	260
6	616	96	636	98	1040	229	820	158
7	617	94	650	106	1360	330	1290	305
8	611	94	672	112	963	204	728	134
9	601	89	713	124	754	141	588	48
10	590	85	717	124	694	123	378	54
11	585	84	761	139	722	135	375	52
12	583	84	901	182	713	132	239	18
13	581	84	1000	210	716	135	256	28
14	584	84	1100	242	716	134	298	33
15	588	84	1210	280	713	136	331	40
16	592	86	1530	375	746	144	347	42
17	596	86	1540	380	845	176	379	50
18	595	88	1450	350	1010	224	400	54
19	606	92	1310	308	1010	224	393	52
20	614	92	1270	290	938	200	400	54
21	616	91	1140	255	838	168	489	76
22	616	92	1150	250	840	170	289	26
23	616	92	1000	210	802	158	236	23
24	610	91	924	188	744	142	280	31
25	607	90	875	171	688	137	311	36
26	602	87	829	160	623	108	444	68
27	597	87	816	154	631	110	331	38
28	593	86	823	157	637	110	301	31
29	591	85	836	163	650	116	314	36
30	587	84	890	181	660	116	334	38
31	590	85	--	--	684	125	337	40
Day	February		March		April		May	
	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)
1	385	52	384	52	342	42	224	16
2	412	58	390	54	348	44	220	16
3	455	70	394	53	355	44	242	19
4	454	68	368	48	366	44	265	24
5	436	62	260	28	396	53	281	26
6	424	60	177	9.5	287	26	298	29
7	423	61	125	7.0	304	35	310	32
8	499	78	126	8.0	309	28	330	36
9	539	90	202	18	244	22	349	38
10	379	48	153	8.0	241	22	373	44
11	363	46	125	7.0	260	26	378	46
12	390	54	111	5.0	285	31	386	46
13	447	71	131	7.5	304	34	--	--
14	394	54	206	16	323	38	444	62
15	414	57	276	30	260	22	403	48
16	239	21	228	18	226	18	393	46
17	289	31	176	12	251	24	402	51
18	239	22	208	16	278	29	418	54
19	256	26	243	22	304	33	418	56
20	311	35	266	26	323	38	435	56
21	267	26	291	31	260	24	451	63
22	252	24	306	34	237	22	465	66
23	264	27	207	16	238	22	481	69
24	276	30	222	20	302	32	496	74
25	303	36	249	25	307	32	517	78
26	319	39	270	28	318	34	517	77
27	337	43	298	31	323	36	456	65
28	347	44	294	29	299	29	310	30
29	347	44	301	32	215	13	346	41
30	--	--	325	38	199	12	378	48
31	--	--	334	40	--	--	428	56

## GREEN RIVER BASIN--Continued

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

Specific conductance and chloride, in parts per million,  
water year October 1963 to September 1964--Continued

Day	June		July		August		September	
	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)	Specific conductance (micro-mhos at 25°C)	Chloride (Cl)
1	446	58	510	76	692	128	468	66
2	451	58	518	78	557	92	489	70
3	476	64	538	82	551	96	494	69
4	505	72	577	93	534	86	494	69
5	532	79	603	113	567	95	497	69
6	542	82	518	81	582	96	499	70
7	552	84	363	41	593	98	511	72
8	558	85	384	46	597	97	518	74
9	572	88	409	56	615	103	531	76
10	581	92	446	64	604	101	542	78
11	592	98	589	106	499	70	547	81
12	601	98	590	82	615	112	554	80
13	601	103	472	74	735	148	555	82
14	302	32	325	36	885	200	563	82
15	308	34	404	57	887	190	563	82
16	269	24	371	50	782	152	566	83
17	316	38	350	42	729	139	562	82
18	310	32	369	46	706	128	557	82
19	342	40	389	47	650	111	555	80
20	359	45	412	55	546	76	562	82
21	412	56	440	63	532	74	564	84
22	398	52	465	70	539	76	569	84
23	359	42	620	118	411	56	575	88
24	393	50	805	174	989	249	578	87
25	423	56	529	80	437	60	625	101
26	508	83	517	77	376	50	671	114
27	568	94	598	106	384	51	631	106
28	502	74	557	92	500	79	601	94
29	526	82	555	91	515	86	631	112
30	545	87	569	98	588	106	696	150
31	--	--	698	136	503	78	--	--



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

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement at 0700)

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		
56	58	61	59	59	59	59	58	59	59	59	59	58	58	58	58	58	57	56	59	58	58	58	58	58	58	60	50	53	53	58		
54	48	47	52	54	52	49	47	47	47	44	45	45	43	47	51	54	50	50	50	50	50	54	45	45	50	51	47	47	44	49		
42	44	42	41	41	38	39	42	40	35	40	41	39	39	34	34	32	32	32	33	33	33	34	34	33	35	37	32	33	33	34	36	
34	34	39	38	36	41	35	33	38	32	32	33	32	32	32	32	34	32	34	36	34	36	41	41	41	42	41	32	32	36	39	35	
39	38	37	37	38	41	40	37	38	40	32	35	38	37	37	38	37	40	40	39	37	32	36	36	37	41	37	38	37	--	--	38	
41	44	45	37	48	47	47	54	49	49	49	47	50	51	49	50	47	48	47	48	47	43	46	50	53	47	47	49	53	43	44	47	
45	51	51	51	54	55	58	57	55	54	57	57	57	58	57	62	64	66	66	68	67	65	65	67	65	64	64	61	60	--	--	59	
59	61	63	64	64	67	67	67	68	68	64	67	64	64	64	65	68	66	68	70	71	72	72	71	69	68	66	62	62	62	66	66	
63	63	65	63	64	68	70	69	72	74	73	73	76	75	74	72	74	72	74	75	78	77	79	78	75	74	75	77	73	76	--	73	
73	73	75	75	73	72	72	74	74	75	74	72	69	70	71	73	71	72	75	77	76	77	76	77	76	77	77	78	76	75	74	73	
75	77	77	77	78	76	75	77	75	73	76	73	68	67	67	67	67	67	68	68	68	67	67	67	66	67	66	66	66	66	70	70	
65	65	65	--	--	64	--	66	68	70	70	66	66	62	63	62	65	64	65	67	67	68	68	64	62	65	59	63	59	60	--	65	

## GREEN RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964

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..	85	3	1	98	6	2	206	7	4
2..	85	2	T	100	5	1	242	5	3
3..	85	1	T	98	6	2	230	6	4
4..	82	1	T	98	7	2	210	7	4
5..	82	1	T	102	9	2	192	5	2
6..	82	1	T	120	6	2	182	5	2
7..	82	1	T	128	7	2	166	4	2
8..	85	1	T	135	5	2	163	5	2
9..	88	1	T	130	6	2	163	6	3
10..	90	1	T	128	9	3	157	6	2
11..	90	1	T	135	10	4	154	5	2
12..	88	1	T	135	9	3	160	5	2
13..	85	2	T	128	10	3	169	3	1
14..	82	2	T	122	6	2	175	2	1
15..	80	2	T	120	8	2	178	2	1
16..	80	2	T	118	8	2	178	1	T
17..	80	2	T	118	4	1	172	1	T
18..	82	2	T	118	2	1	175	2	1
19..	85	2	T	118	2	1	157	3	1
20..	85	2	T	120	2	1	148	2	1
21..	85	2	T	120	2	1	145	2	1
22..	85	3	1	122	3	1	140	4	2
23..	85	6	1	130	7	2	135	3	1
24..	85	6	1	138	5	2	135	4	1
25..	88	6	1	138	3	1	128	3	1
26..	88	7	2	142	6	2	130	5	2
27..	88	7	2	138	12	4	132	4	1
28..	90	7	2	138	6	2	132	5	2
29..	90	6	1	154	5	2	132	9	3
30..	90	5	1	172	5	2	132	3	1
31..	90	5	1	--	--	--	135	2	1
Total	2647	--	20	3761	--	59	5053	--	55
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..	145	3	1	755	2	4	968	5	13
2..	148	2	1	726	1	2	1020	5	14
3..	154	4	2	703	4	8	1270	5	17
4..	222	12	7	680	13	24	4350	432	7920
5..	354	20	19	636	2	3	15300	1010	41700
6..	636	20	34	622	3	5	19800	568	30400
7..	986	55	146	708	3	6	20700	545	30500
8..	1860	122	613	872	4	9	22000	414	24600
9..	2070	105	587	1030	6	17	24900	400	26900
10..	2510	87	590	1020	7	19	33400	339	30600
11..	2420	94	614	920	2	5	43100	421	49000
12..	2330	106	667	896	2	5	40700	265	29100
13..	1340	40	145	980	3	8	30500	141	11600
14..	800	21	45	1840	19	123	15700	90	3800
15..	600	19	31	3310	98	876	7300	175	3450
16..	540	22	32	4030	102	1110	9160	165	4080
17..	500	10	14	3960	66	707	9240	116	2890
18..	450	6	7	3710	55	551	6290	67	1140
19..	550	4	6	3100	38	318	4240	50	572
20..	1040	134	571	3350	34	308	3400	45	413
21..	3360	480	4350	3340	34	307	3480	47	442
22..	3540	219	2090	2980	34	274	4880	65	856
23..	2660	122	876	2430	16	105	5230	66	932
24..	1750	69	326	1960	10	53	4040	42	458
25..	1620	46	201	1640	10	44	3200	34	294
26..	2200	47	279	1410	8	30	2780	30	225
27..	2120	39	223	1210	5	16	2550	28	193
28..	1620	26	114	1080	6	17	2220	23	138
29..	1240	13	44	1000	7	19	1920	22	114
30..	986	6	16	--	--	--	1720	21	98
31..	836	2	4	--	--	--	1560	17	72
Total	41587	--	12655	50898	--	4973	346918	--	302531

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed from partly estimated-concentration graph.

## GREEN RIVER BASIN--Continued

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

## Suspended sediment, water year October 1963 to September 1964--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..	1410	15	57	4100	55	609	712	67	129
2..	1290	16	56	3620	47	459	626	50	84
3..	1230	17	56	2690	35	254	568	37	57
4..	1630	61	292	2100	28	159	518	27	38
5..	2160	140	816	1700	19	87	469	23	29
6..	2250	90	547	1400	16	60	424	20	23
7..	2370	64	410	1180	11	35	392	18	19
8..	3500	268	2540	1040	9	25	366	15	15
9..	3440	108	1000	932	7	18	350	13	12
10..	2920	52	410	825	8	16	330	14	12
11..	2330	34	214	765	8	16	302	12	10
12..	1940	26	136	740	9	18	282	11	8
13..	1720	25	116	810	10	22	2560	--	6000
14..	3120	62	522	810	10	22	3680	1400	14000
15..	3340	76	685	716	8	15	3120	752	6330
16..	2780	45	338	658	7	12	2620	500	3540
17..	2180	32	188	604	6	10	1910	280	1440
18..	1820	27	133	550	5	7	1360	158	580
19..	1620	23	101	500	5	7	1150	108	335
20..	2000	80	517	460	7	9	908	90	221
21..	3380	291	2660	438	5	6	842	63	143
22..	2790	114	859	406	7	8	854	52	120
23..	2180	46	271	384	7	7	662	35	62
24..	1770	21	100	366	6	6	672	30	54
25..	1510	17	69	350	4	4	564	25	38
26..	1380	20	74	338	7	8	446	27	32
27..	2910	76	675	4510	1700	A 21000	415	13	14
28..	6030	194	3160	3520	1130	S 12200	428	13	15
29..	7160	161	3110	1880	400	2030	384	9	9
30..	5580	86	1300	1230	150	498	338	7	6
31..	--	--	--	878	78	185	--	--	--
Total	79740	--	21412	40500	--	37814	28252	--	33375
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..	306	7	6	342	15	14	175	26	12
2..	290	10	8	278	21	16	151	21	8
3..	294	14	11	234	26	16	132	20	7
4..	640	128	272	206	20	11	125	18	6
5..	1180	215	685	189	15	8	118	17	5
6..	765	98	202	125	11	5	112	15	4
7..	577	85	132	160	11	5	105	13	4
8..	572	65	100	175	14	7	100	13	4
9..	640	57	98	350	19	18	95	13	3
10..	505	36	49	282	21	16	90	14	3
11..	438	25	30	210	24	14	90	14	3
12..	636	--	350	282	32	24	82	11	2
13..	1880	500	2500	322	48	42	75	7	1
14..	1320	360	1280	258	33	23	72	4	1
15..	872	143	337	214	20	12	70	5	1
16..	703	101	192	186	18	9	70	3	1
17..	559	50	75	166	14	6	70	5	1
18..	456	30	37	157	14	6	75	5	1
19..	384	23	24	151	12	5	85	7	2
20..	379	19	19	148	12	5	90	6	1
21..	433	15	18	148	13	5	88	7	2
22..	379	14	14	347	113	S 167	95	6	2
23..	310	10	8	1970	719	S 3820	98	4	1
24..	274	8	6	1080	252	S 827	115	4	1
25..	262	8	6	487	100	131	135	4	1
26..	322	9	8	559	110	B 170	115	4	1
27..	290	11	9	680	133	244	105	7	2
28..	246	12	8	474	66	84	438	--	120
29..	318	18	15	350	56	53	1090	160	470
30..	680	27	50	266	42	30	1720	222	1030
31..	559	22	33	210	35	20	--	--	--
Total	17469	--	6582	11056	--	5813	5981	--	1700

Total discharge for year (cfs-days)..... 633862

Total load for year (tons)..... 426989

E Estimated.

A Computed from partly estimated-concentration graph.

S Computed by subdividing day.

B Computed from estimated-concentration graph.

## GREEN RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1963 to September 1964

(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)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment con- cen- tration (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. 5, 1964.....	0700			14000	1140		50	59	69	87	97	98	100	--				SBWC
Mar. 5.....	0700			14000	1140		17	22	43	69	95	96	99	100				SBN
May 28.....	0700			4270	1480		46	58	73	88	97	98	99	100				SBWC
June 15.....	0700			3340	798		49	64	79	92	99	100	--	--				SBWC

## GREEN RIVER BASIN—Continued

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

LOCATION.—At Mammoth Cave Ferry crossing, 350 feet upstream from stage 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 444 square miles does not contribute directly to surface runoff.

RECORDS AVAILABLE.—Chemical analyses: September 1959 to September 1964.

Water temperatures: October 1959 to June 1961.

REMARKS.—Values reported for iron are in solution when analyzed. No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Calcium	Non-carbonate			
Oct. 5, 1963	.....	.....	..	.....	.....	.....	.....	..	..	70	..	..	..	..	..	461	..	..
Oct. 12	.....	.....	0.00	.....	.....	.....	.....	184	24	66	0.1	1.2	..	196	45	552	7.4	..
Oct. 13	.....	.....	.....	.....	.....	.....	.....	..	..	69	..	..	..	..	..	508	..	..
Oct. 19	.....	.....	.....	.....	.....	.....	.....	..	..	68	..	..	..	..	..	466	..	..
Oct. 26	.....	.....	..	.....	.....	.....	.....	..	..	68	..	..	..	..	..	479	..	..
Nov. 2	.....	.....	..	.....	.....	.....	.....	..	..	..	..	..	..	..	..	..	..	..
Nov. 9	.....	.....	..	.....	.....	.....	.....	..	..	66	..	..	..	..	..	467	..	..
Nov. 16	.....	.....	..	.....	.....	.....	.....	180	27	102	..	..	..	235	88	572	7.0	..
Nov. 20	.....	.....	.02	.....	.....	.....	.....	..	..	154	.0	1.0	..	..	..	826	..	..
Nov. 23	.....	.....	..	.....	.....	.....	.....	..	..	136	..	..	..	..	..	1740	..	..
Nov. 30	.....	.....	..	.....	.....	.....	.....	..	..	136	..	..	..	..	..	782	..	..
Dec. 7	.....	.....	..	.....	.....	.....	.....	..	..	212	..	..	..	..	..	981	..	..
Dec. 14	.....	.....	..	.....	.....	.....	.....	..	..	140	..	..	..	..	..	761	..	..
Dec. 21	.....	.....	..	.....	.....	.....	.....	..	..	132	..	..	..	..	..	744	..	..
Dec. 28	.....	.....	..	.....	.....	.....	.....	..	..	140	..	..	..	..	..	763	..	..
Jan. 4, 1964	.....	.....	..	.....	.....	.....	.....	..	..	100	..	..	..	..	..	625	..	..
Jan. 22	.....	.....	.15	.....	.....	.....	.....	110	23	57	.0	4.8	..	134	44	419	6.9	..
Jan. 25	.....	.....	..	.....	.....	.....	.....	..	..	34	..	..	..	..	..	330	..	..
Feb. 8	.....	.....	..	.....	.....	.....	.....	..	..	54	..	..	..	..	..	420	..	..
Feb. 11	.....	.....	..	.....	.....	.....	.....	..	..	42	..	..	..	..	..	367	..	..
Feb. 15	.....	.....	..	.....	.....	.....	.....	..	..	56	..	..	..	..	..	399	..	..
Feb. 18	.....	.....	.12	.....	.....	.....	.....	84	20	24	.0	3.2	..	94	25	284	6.7	..
Feb. 19	.....	.....	..	.....	.....	.....	.....	..	..	44	..	..	..	..	..	376	..	..
Feb. 23	.....	.....	..	.....	.....	.....	.....	..	..	24	..	..	..	..	..	267	..	..



## GREEN RIVER BASIN--Continued

3-3091. WET PRONG BUFFALO CREEK NEAR MAMMOTH CAVE, KY.

LOCATION--At staff gage, 280 feet upstream from Chicken Hollow, 5.0 miles northwest of Mammoth Cave, Edmonson County, and 5.8 miles northeast of Brownsville.  
 DRAINAGE AREA, 2,226 square miles.

REMARKS--Sediment records: Periodic sampling October 1963 to September 1964.  
 REMARKS--No discharge records available.

Periodic determinations of suspended sediment, water year October 1963 to September 1964--Continued  
 (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)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (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			
Oct. 17, 1963....	1645									
Oct. 25.....	1430			0.8	46	0.1				
Nov. 1.....	1105			1.2	12	T				
Nov. 8.....	1300			1.0	7	T				
Nov. 21.....	1300			1.0	7	T				
Nov. 27.....	1410			.9	6	T				
Dec. 2.....	1430			.9	6	T				
Dec. 6.....	1335			.8	5	T				
Dec. 13.....	1315			.8	7	T				
Dec. 17.....	1540			.6	7	T				
Dec. 24.....	1045			.5	6	T				
Jan. 4, 1964.....	1030			.8	11	T				
Jan. 6.....	0950			5.5	62	.9				
Jan. 18.....	1410			.7	20	T				
Jan. 20.....	0925			10	44	1.1				
Jan. 30.....	0900			1.0	1	T				
Feb. 7.....	0945			1.2	3	T				
Feb. 14.....	0905			1.5	1	T				
Feb. 18.....	0930			2.0	7	T				
Feb. 26.....	1455			.7	6	T				
Mar. 2.....	1455			550	2520	3740				
Mar. 4.....	1020			100	45	12				
Mar. 9.....	1040			100	45	.2				
Mar. 15.....	1115			8.0	12					
Mar. 25.....	1340			1.4	4	T				
Apr. 12.....	1100			1.1	7	T				
Apr. 20.....	0940			1.1	4	T				
Apr. 23.....	1135			1.9	7	T				
Apr. 30.....	1050			1.3	4	T				
May 4.....	0930			1.3	3	T				

	0.6	29	T
July 8, 1964.....	10.40		
July 15.....	08.15		
July 22.....	11.11		
July 29.....	08.35	4	T
Aug. 5.....	10.40	1	T
Aug. 12.....	09.00	1	T
Aug. 13.....	1.0		
Aug. 30.....	09.40	1	T
Sept. 4.....	6	5	T
Sept. 11.....	08.35	2	T
Sept. 18.....	8		

T Less than 0.05 ton.

33-3110. NOLIN RIVER AT KYROCK, KY.

LOCATION.--Temperature recorder at gaging station, 470 feet downstream from Dismal Creek, 0.3 mile downstream from Nolin River Dam, 1.2 miles upstream from Pigeon Creek, 0.9 mile northeast of Kyrock, Edmonson County, and 7.5 miles upstream from mouth.

DRAINAGE AREA.--707 square miles (including that of Dismal Creek), of which about 223 square miles does not contribute directly to surface runoff.

---707 square miles (including that of Dismal Creek), of which about 223 square miles does not contribute directly to surface runoff.

RECORDS AVAILABLE, --Water temperatures: October 1962 to September 1964.

RECORDS AVAILABLE, --Water temperatures, October 1902 to September 1904, 39° F June 17, 23, 24; minimum, 77° F June 17, 23, 24; maximum, 77° F June 17, 23, 24; minimum, 39° F on many days during January and February, 1963-64. --Water temperatures: Maximum, 1963-64.

EXTRIMES, 1963-64. --Water temperatures: maximum, 77°F June 17, 23, 24, 1964; minimum, 34°F Jan. 31 to Feb. 6, 1963. 1962-64. --Water temperatures: Maximum. 77°F June 17, 23, 24, 1964; minimum, 34°F Jan. 31 to Feb. 6, 1963.

REMARKS.--Flow regulated by Nolin River Reservoir.

REMARKS.--FLOW REGULATED BY NOTIN RIVER RESERVOIR.

Chemical analyses. in parts per million. water year October 1963 to September 1964

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>	Total acidity (micro-mhos at H <sup>+</sup> 25°C)	Color or pH	
Nov. 20, 1963.				0.10							180	0	13	5.0	0.0	2.0		157	10	315	6.8
Jan. 22, 1964.	.68										166	0	28	5.0	.1	2.5		164	26	332	6.8
July 22, 1964.	.10										102	0	3	23	4.2	4.4		126	42	309	7.5
Sept. 30, 1964.	.16										140	0	11	4.0	3.2	4.4	151	124	10	247	7.9





GREEN RIVER BASIN--Continued

LOCATION. --Temperature recorder at gaging station on left bank in Allen County, 1,200 feet upstream from Port Oliver Ford, 2,500 feet upstream from Difficult Creek, 0.5 mile downstream from Barren River Dam and 2.1 miles southwest of Finney, Barren County.

DRAINAGE AREA. --940 square miles, of which about 77 square miles does not contribute directly to surface runoff.

RECORDS AVAILABLE. --Water temperatures: August and September 1961, (unpublished), November 1962 to September 1964.

RECORDS AVAILABLE. --Water temperatures: Maximum, 91°F July 3, 4, 8, 9, 1963; minimum, not determined.

REMARKS. --Record not operating Nov. 13-18, (range 52°F to 55°F); Nov. 24 to Jan. 7, (range 33°F to 58°F); Jan. 8 to Feb. 17, Apr. 28 to July 23, Aug. 13-20, (range 78°F to 83°F), Sept. 1-30. Flow regulated by Barren River Reservoir.

Temperature (°F) of water, water year October 1963 to September 1964 (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	
October	63	64	64	64	64	64	65	65	65	64	65	65	65	64	64	64	64	63	62	61	62	62	62	63	64	64	64	64	64	62	60	
Maximum	62	62	64	62	62	64	64	64	64	63	63	64	64	63	63	63	63	62	61	61	62	62	62	63	64	64	64	64	62	60		
Minimum	60	59	57	56	56	56	56	56	56	56	56	56	55	--	--	--	--	--	53	53	54	55	56	--	--	--	--	--	--	63		
November	59	57	56	56	56	56	56	56	56	56	56	55	--	--	--	--	--	--	53	53	53	54	56	--	--	--	--	--	--	--	--	
Maximum	59	57	56	56	56	56	56	56	56	56	56	55	--	--	--	--	--	--	53	53	53	54	56	--	--	--	--	--	--	--	--	
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	48	48	47	48	48	48	48	47	47	49	49	51	51	51	51	51	52	52	51	51	52	52	52	52	52	52	52	52	52	52	50	
Minimum	48	48	47	45	46	48	47	47	47	47	49	50	51	51	51	51	52	52	51	51	52	52	52	52	52	52	52	52	52	52	50	
April	52	52	52	52	52	52	53	53	53	53	53	55	55	56	58	58	58	58	58	57	57	60	63	63	63	64	64	---	---	---	56	
Maximum	52	52	52	52	52	52	53	53	53	53	53	55	55	56	58	58	58	58	58	57	57	60	63	63	63	64	64	---	---	---	56	
Minimum	52	52	52	52	52	52	53	53	53	53	53	54	55	55	56	58	58	58	57	57	57	60	60	60	59	62	64	---	---	---	56	
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
August	85	84	86	85	87	87	86	84	87	86	87	86	--	--	--	--	--	--	--	--	--	--	--	--	83	83	82	84	84	83	83	86
Maximum	81	80	82	83	84	84	84	82	82	83	84	78	--	--	--	--	--	--	--	--	--	--	--	--	81	80	80	81	80	80	81	81
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



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

LOCATION.--Temperature recorder at gaging station on left bank, 0.1 mile upstream from lock 4, at Woodbury, Butler County, and 1.2 miles downstream from Barren Reservoir.  
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 1964.  
EXTREMES, 1963-64.--Water temperatures: Maximum, 89°F Aug. 4; minimum, 34°F on many days during December and January.  
EXTREMES, 1958-64.--Water temperatures: Maximum, 89°F Aug. 4, 1964; minimum, 33°F Jan. 28 to Feb. 5, 1961, Jan. 26-28, 1963.  
REMARKS.--No temperature record Jan. 15-28. Flow partly regulated by Nolin River Reservoir and Barren River Reservoir.

Temperature (°F) of water, water year October 1963 to September 1964  
(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	70	70	70	69	69	70	69	68	68	68	68	68	68	68	67	67	67	66	66	66	66	66	65	65	65	65	66	66	66	65	67	
Maximum	70	70	70	69	69	70	69	68	68	68	68	68	68	68	67	67	67	66	66	66	66	66	65	65	65	65	66	66	66	65	67	
Minimum	63	62	60	60	59	58	58	58	58	58	57	57	55	55	54	53	54	54	54	54	55	55	55	55	54	54	53	53	52	51	--	
November	62	60	60	59	58	58	58	58	57	57	57	55	55	55	54	53	54	54	54	54	54	55	55	55	54	54	53	53	52	51	--	
Maximum	62	60	60	59	58	58	58	58	57	57	57	55	55	55	54	53	54	54	54	54	54	55	55	55	54	54	53	53	52	51	--	
Minimum	51	50	49	49	48	48	48	48	47	46	46	46	45	44	43	42	41	38	38	38	38	38	38	38	38	38	36	36	34	42	41	
December	50	49	49	48	48	48	48	47	46	46	46	45	44	43	42	41	41	38	37	37	37	37	36	36	35	35	35	34	34	41	41	
Maximum	50	49	49	48	48	48	48	47	46	46	46	45	44	43	42	41	41	38	37	37	37	37	36	36	35	35	35	34	34	41	41	
Minimum	34	36	36	36	36	36	34	34	35	35	36	36	36	36	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
January	34	36	36	36	36	36	34	34	35	35	36	36	36	36	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Maximum	43	43	42	41	40	40	40	40	40	40	40	40	39	39	39	39	39	39	40	40	41	41	40	40	40	40	40	41	41	--	40	
Minimum	42	42	41	40	40	40	40	39	39	39	39	39	39	39	39	39	39	39	40	40	40	40	40	40	40	40	40	40	40	--	40	
February	41	41	41	41	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	--	40	
Maximum	41	41	41	41	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	--	40	
Minimum	40	40	41	41	40	39	39	39	39	39	39	39	39	39	39	39	39	39	40	40	40	40	40	40	40	40	40	40	40	--	40	
March	50	50	51	52	52	53	55	56	56	56	56	57	58	58	58	59	59	59	60	61	62	63	64	64	65	66	66	65	65	65	66	59
Maximum	50	50	51	52	52	53	55	56	56	56	56	57	58	58	58	59	59	59	60	61	62	63	64	64	65	66	66	65	65	65	66	59
Minimum	50	50	50	51	52	52	53	55	56	56	56	57	58	58	58	59	59	59	60	61	62	63	64	64	65	66	66	65	65	65	66	58
April	63	63	64	65	65	67	69	68	69	71	69	70	71	73	75	77	79	78	80	81	77	77	77	77	81	80	75	73	71	69	72	69
Maximum	63	63	64	65	65	67	69	68	69	71	69	70	71	73	75	77	79	78	80	81	77	77	77	77	81	80	75	73	71	69	72	69
Minimum	63	63	62	62	64	65	65	65	67	67	67	68	68	68	68	68	68	68	68	69	69	71	73	73	76	75	75	73	71	69	69	69
May	72	72	73	74	75	75	78	81	80	83	82	85	86	82	77	77	77	78	81	84	83	86	84	83	84	84	83	84	83	85	81	--
Maximum	69	69	69	69	71	72	73	75	77	77	79	79	76	75	76	76	77	78	81	84	83	86	84	83	84	84	83	84	83	85	81	--
Minimum	69	69	69	69	71	72	73	75	77	77	79	79	76	75	76	76	77	78	81	84	83	86	84	83	84	84	83	84	83	85	81	--
June	81	83	84	84	82	80	82	81	81	83	82	80	79	79	79	78	77	77	79	80	81	86	85	85	87	86	87	85	87	84	85	83
Maximum	79	79	76	79	80	79	79	79	80	81	82	80	79	79	79	78	77	77	79	80	81	86	85	85	87	86	87	85	87	84	85	83
Minimum	79	79	76	79	80	79	79	79	80	81	82	80	79	79	79	78	77	77	79	80	81	86	85	85	87	86	87	85	87	84	85	83
July	84	86	87	89	88	86	87	86	85	84	85	83	80	79	78	82	79	78	82	85	88	89	88	87	86	87	85	87	84	85	83	80
Maximum	83	83	84	85	86	84	84	82	81	83	83	80	79	79	78	77	77	77	78	79	79	79	79	79	79	79	79	79	79	79	79	80
Minimum	81	79	80	81	81	81	81	81	81	80	79	78	77	77	76	76	74	74	74	75	75	74	73	73	73	72	72	70	67	63	--	74
August	77	77	77	77	77	77	78	78	78	78	78	76	75	75	74	74	74	74	74	75	75	73	73	73	73	72	72	70	67	63	--	74
Maximum	77	77	77	77	77	77	78	78	78	78	78	76	75	75	74	74	74	74	74	75	75	73	73	73	73	72	72	70	67	63	--	74
Minimum	77	77	77	77	77	77	78	78	78	78	78	76	75	75	74	74	74	74	74	75	75	73	73	73	73	72	72	70	67	63	--	74



## GREEN RIVER BASIN--Continued

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 3.6 miles downstream from gaging station near Dundee.

DRAINAGE.--Downstream from gaging station near Dundee.

RECORDS AVAILABLE.--Water temperatures: October 1949 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 80°F Aug. 6; minimum, freezing point on many days during December and January.

EXTREMES, 1949-64.--Water temperatures: Maximum, 89°F Aug. 3, 1955; minimum, freezing point on many days during winter months.

REMARKS.--Stream frozen Dec. 15 to Jan. 9, Jan. 14-20. Flow regulated by Rough River Reservoir. Records of discharge are given for gaging station near Dundee.

Month	Day																															Average	
	Temperature (°F) of water, water year October 1963 to September 1964.																																
	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	59	62	62	64	64	62	63	62	63	62	63	65	64	64	65	61	69	65	65	66	65	68	67	68	67	70	66	65	61	59	60	64	
0700.....	61	63	66	67	61	64	66	65	66	66	67	68	66	67	63	70	67	66	65	67	68	67	67	68	68	67	67	64	60	61	62	65	
November	60	58	58	57	58	59	58	57	56	56	55	53	51	50	49	50	51	54	51	52	55	54	55	56	53	50	49	50	51	50	49	48	--
1600.....	59	59	57	59	60	60	59	58	57	57	55	52	51	51	52	52	52	55	53	54	55	56	55	53	50	49	50	52	51	48	47	--	
December	45	45	43	42	43	41	43	45	42	43	36	38	36	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	36	
0700.....	45	44	44	42	42	44	44	44	39	35	40	39	35	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	36	
1600.....	32	32	32	32	32	32	32	32	32	32	34	35	33	32	32	32	32	32	32	32	35	36	38	40	39	36	34	34	32	36	35	34	
January	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	36	39	42	43	37	36	37	34	35	36	37	34	
February	38	37	36	37	38	41	41	38	38	37	36	36	37	39	40	39	39	40	39	38	37	37	37	37	37	36	38	38	39	38	37	--	37
0700.....	39	38	39	40	40	42	39	37	37	38	38	36	37	39	40	39	39	40	39	38	37	37	37	37	36	38	38	39	38	37	--	38	
1600.....	37	39	45	47	45	46	47	48	49	43	46	45	46	50	50	48	49	48	47	46	45	44	43	47	51	48	47	48	47	44	44	46	
March	38	42	46	46	47	48	49	47	46	49	46	45	46	48	49	49	50	49	48	47	45	45	44	49	51	49	48	49	46	45	46	47	
0700.....	37	39	45	47	45	46	47	48	49	43	46	45	46	50	50	48	49	48	47	46	45	44	43	47	51	48	47	48	47	44	44	46	
1600.....	38	42	46	46	47	48	49	47	46	49	46	45	46	48	49	49	50	49	48	47	45	45	44	49	51	49	48	49	46	45	46	47	
April	44	48	51	49	49	50	53	51	53	55	56	54	55	53	55	54	55	56	55	56	57	56	57	59	55	55	56	56	55	54	--	54	
0700.....	43	50	52	50	50	52	54	50	54	55	56	54	55	54	55	56	56	57	58	57	58	57	59	57	56	55	55	57	57	55	54	--	
May	53	54	56	57	60	60	62	63	62	61	60	60	58	57	59	61	63	66	67	69	68	71	71	72	71	71	70	71	71	66	65	69	63
0700.....	54	56	56	57	59	61	63	63	64	63	62	61	60	59	58	61	63	66	67	70	72	72	71	72	73	73	73	70	67	68	65	64	
1600.....	66	65	63	59	60	61	62	66	70	73	71	73	74	74	75	77	76	73	72	71	75	76	73	71	70	72	73	72	73	74	--	70	
June	67	66	61	60	62	63	64	68	71	74	75	75	76	77	78	79	76	74	73	73	74	75	76	73	72	74	75	74	75	75	--	72	
0700.....	70	74	73	72	72	71	72	70	72	71	71	69	68	70	70	71	72	72	72	72	74	75	76	75	76	75	76	75	74	75	76	74	72
1600.....	76	75	74	74	73	72	71	72	73	75	72	70	69	70	72	73	74	73	74	73	75	76	77	77	78	77	76	75	74	75	77	78	74
July	72	74	75	78	78	77	76	77	77	74	75	74	68	65	65	65	65	66	67	71	72	69	68	69	70	72	72	72	72	73	73	72	
0700.....	75	76	78	79	79	80	78	79	78	76	77	73	68	64	66	67	69	73	74	73	74	73	70	71	72	71	73	74	74	75	73	73	
1600.....	72	71	70	71	75	70	71	70	69	67	62	60	58	57	56	57	60	61	63	65	64	66	65	63	60	61	61	60	62	62	--	64	
August	73	72	73	73	77	73	73	74	73	66	61	60	59	57	58	57	60	62	63	67	65	67	65	61	60	62	62	61	64	61	--	65	
0700.....	72	71	70	71	75	70	71	70	69	67	62	60	58	57	56	57	60	61	63	65	64	66	65	63	60	61	61	60	62	62	--	64	
1600.....	73	72	73	73	77	73	73	74	73	66	61	60	59	57	58	57	60	62	63	67	65	67	65	61	60	62	62	61	64	61	--	65	

WABASH RIVER BASIN  
3-3235. WABASH RIVER AT HUNTINGTON, IND.

LOCATION.--Temperature recorder at gaging station on right bank at the Huntington Water and Light Company Plant, 2 miles south of courthouse in Huntington, Huntington County, 3.2 miles upstream from mouth of Little River, and at mile 409.  
DRAINAGE AREA.--710 square miles.  
RECORDS AVAILABLE.--Water temperatures: October 1963 to September 1964.  
EXTREMES, 1963-64.--Water temperatures: Maximum, 90°F July 27.  
REMARKS.--No record available during winter months.

Temperature (°F) of water, water year October 1963 to September 1964  
(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	71	71	71	71	71	71	71	71	72	70	69	69	68	70	69	71	71	68	70	68	70	70	70	66	66	67	67	65	62	58	56	68	
Maximum	67	68	69	68	67	68	69	66	68	68	68	67	66	65	67	68	68	67	67	68	68	66	64	64	65	64	65	62	58	56	66		
November	56	54	52	52	52	54	54	54	53	53	52	52	52	52	52	52	54	55	53	53	54	54	54	54	54	54	54	54	54	54	54		
Maximum	57	56	54	52	52	52	54	54	53	53	52	52	52	52	52	52	54	55	53	53	54	54	54	54	54	54	54	54	54	54	54		
Minimum	56	54	52	52	52	52	52	53	53	52	52	52	52	52	52	52	52	54	53	52	51	52	50	50	50	50	50	50	50	50	50		
December	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
Maximum	57	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
Minimum	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
January	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
Maximum	57	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
Minimum	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
February	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
Maximum	57	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
Minimum	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
March	56	54	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52		
Maximum	38	36	35	35	36	38	38	38	40	40	38	38	38	39	40	42	42	40	40	38	41	42	45	45	44	40	40	40	38	38	39		
Minimum	34	34	35	34	35	35	38	38	38	38	36	36	36	36	39	40	42	40	38	38	38	40	42	44	40	37	39	38	36	36	38		
April	41	41	42	42	42	45	48	48	46	47	48	52	52	52	52	55	58	58	57	53	49	48	48	52	54	55	56	54	55	55	55	50	
Maximum	36	41	40	42	42	42	45	48	45	44	45	47	48	50	50	52	54	57	53	49	48	48	48	52	54	54	54	55	55	55	55	48	
Minimum	57	60	64	66	68	70	72	73	73	70	71	67	67	67	69	70	73	74	79	79	75	78	80	86	80	78	75	75	70	70	70	72	
May	55	57	59	62	64	67	67	70	68	66	67	67	64	63	64	67	69	69	74	74	68	70	74	75	72	73	71	66	62	64	65	67	
Maximum	60	70	68	70	70	75	81	84	84	82	80	84	86	86	80	86	80	77	76	82	80	77	76	79	78	83	84	86	87	85	79	79	
Minimum	66	65	64	65	67	66	72	71	78	74	73	76	80	80	72	69	74	74	76	74	74	76	76	76	72	76	78	79	80	81	77	73	
June	84	83	82	79	80	78	75	68	72	75	78	78	76	71	76	81	84	84	86	88	86	87	88	89	87	89	90	88	86	84	82	82	
Maximum	81	80	79	75	72	74	67	66	68	70	74	76	70	68	70	74	77	78	77	79	78	77	76	76	76	76	78	80	79	83	82	80	
Minimum	77	82	84	84	80	80	79	80	74	73	76	72	68	67	68	68	72	74	71	72	76	76	72	71	74	70	72	76	75	77	76	75	
July	80	80	81	82	79	77	81	82	83	81	81	75	71	68	68	68	72	72	68	72	70	74	76	77	70	84	64	65	64	65	64	74	
Maximum	74	72	74	76	73	70	70	75	76	76	75	68	64	62	66	64	68	68	66	67	70	74	70	64	61	62	62	60	60	60	60	60	
Minimum	80	80	81	82	79	77	81	82	83	81	81	75	71	68	68	68	72	72	68	72	70	74	76	77	70	84	64	65	64	65	64	74	
August	74	72	74	76	73	70	70	75	76	76	75	68	64	62	66	64	68	68	66	67	70	74	70	64	61	62	62	60	60	60	60	60	
September	80	80	81	82	79	77	81	82	83	81	81	75	71	68	68	68	72	72	68	72	70	74	76	77	70	84	64	65	64	65	64	74	
Maximum	80	80	81	82	79	77	81	82	83	81	81	75	71	68	68	68	72	72	68	72	70	74	76	77	70	84	64	65	64	65	64	74	
Minimum	74	72	74	76	73	70	70	75	76	76	75	68	64	62	66	64	68	68	66	67	70	74	70	64	61	62	62	60	60	60	60	60	

## WABASH RIVER BASIN--Continued

3-3355. WABASH RIVER AT LAFAYETTE, IND.

LOCATION.--Temperature recorder at gaging station on right bank, 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 1964.

EXTREMES: 1953-64.--Water temperatures: Maximum, 78°F July 23 to Aug. 12; minimum, freezing point Dec. 14-31.

EXTREMES: 1964-64.--Water temperatures: Maximum, 90°F July 30, 31, 1964; 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 1963 to September 1964

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



## WABASH RIVER BASIN--Continued

## 3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.

LOCATION.--At gaging station at county road bridge, 8,350 feet upstream from Ramp Creek, and 3.1 mi<sup>1</sup> northwest of Fincastle, Putnam County.

DRAINAGE AREA.--132 square miles.

RECORDS AVAILABLE.--Sediment records: August 1959 to September 1964.

EXTREMES, 1959-64.--Sediment concentrations: Maximum daily, 19,100 ppm Mar. 21, 1962; minimum daily 3 ppm Dec. 12, 14, 16, 17, 1961, Dec. 1, 1963.

Sediment loads: Maximum daily, 260,000 tons Mar. 21, 1962; minimum daily, less than 0.50 ton on many days during 1959-64.

REMARKS.--Flow affected by ice on many days each year. Published and unpublished data on file at district office at Columbus, Ohio. The name of this station was changed from Raccoon Creek near Fincastle to Big Raccoon Creek near Fincastle starting with the 1964 water year. Sediment discharge computed from field and laboratory data supplied by Indiana Flood Control and Water Resources Commission.

## Suspended sediment, August and September 1959

Day				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..				--	--	--	8.0	55	1.2
2..				--	--	--	8.2	44	1.0
3..				--	--	--	7.8	33	.7
4..				--	--	--	7.3	27	.5
5..				--	--	--	7.1	18	.3
6..				--	--	--	6.8	33	.6
7..				--	--	--	6.2	28	.5
8..				--	--	--	5.7	16	.2
9..				--	--	--	5.7	23	.4
10..				--	--	--	6.8	22	.4
11..				--	--	--	5.7	35	.5
12..				--	--	--	4.9	19	.2
13..				--	--	--	4.6	25	.3
14..				10	33	0.9	4.2	23	.3
15..				10	45	1.2	4.0	28	.3
16..				41	72	.5	4.0	41	.4
17..				250	364	.5	4.0	42	.4
18..				67	148	.27	4.2	38	.4
19..				29	82	6.4	4.2	40	.4
20..				20	56	3.0	4.2	40	.4
21..				15	56	2.3	4.2	35	.4
22..				13	48	1.7	4.0	32	.3
23..				12	37	1.2	4.0	22	.2
24..				11	46	1.4	4.4	36	.4
25..				11	41	1.2	4.6	37	.4
26..				10	37	1.0	5.1	25	.3
27..				10	40	1.1	6.6	20	.4
28..				9.5	45	1.2	7.3	22	.4
29..				9.0	36	.9	7.3	32	.6
30..				8.5	33	.8	6.8	33	.6
31..				7.8	39	.8	--	--	--
Total				543.8	--	332.1	167.9	--	13.4
Total discharge for period (cfs-days).....									711.7
Total load for period (tons).....									345.3

S Computed by subdividing day.

## WABASH RIVER BASIN--Continued

3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--Continued

Suspended sediment, water year October 1959 to September 1960  
(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..	6.4	44	0.8	15	44	1.8	20	12	0.6
2..	6.2	34	.6	15	35	1.4	20	15	.8
3..	6.4	37	.6	14	28	1.0	21	13	.7
4..	6.4	26	.4	80	230	A 50	20	16	.9
5..	6.6	43	.8	122	150	A 50	21	17	1.0
6..	7.3	52	1.0	59	47	7.5	23	14	.9
7..	7.3	30	.6	36	22	2.1	22	13	.8
8..	7.1	44	.8	28	12	.9	22	7	.4
9..	6.8	34	.6	24	13	.8	20	12	.6
10..	9.5	35	.9	22	23	1.4	20	12	.6
11..	169	390	S 194	20	42	2.3	30	16	1.3
12..	60	75	12	19	33	1.7	230	170	S 148
13..	24	96	6.2	55	58	S 9.9	404	167	S 200
14..	17	63	2.9	189	107	55	230	38	24
15..	14	45	1.7	174	52	24	165	32	14
16..	13	43	1.5	112	34	10	137	18	6.6
17..	12	38	1.2	74	74	15	117	15	4.7
18..	12	33	1.1	52	39	5.5	98	14	3.7
19..	12	42	1.4	47	30	3.8	81	13	2.8
20..	12	38	1.2	40	16	1.7	70	10	1.9
21..	12	48	1.6	37	12	1.2	65	9	1.6
22..	12	46	1.5	34	16	1.5	59	9	1.4
23..	12	48	1.6	30	34	2.8	55	12	1.8
24..	22	44	2.6	28	33	2.5	53	16	2.3
25..	32	37	3.2	28	19	1.4	52	16	2.2
26..	33	24	2.1	25	15	1.0	52	14	2.0
27..	25	24	1.6	24	18	1.2	58	53	8.3
28..	20	10	.5	23	18	1.1	197	--	50
29..	17	8	.4	21	15	.8	231	72	45
30..	15	27	1.1	20	19	1.0	205	32	18
31..	15	42	1.7	--	--	--	159	13	5.6
Total	630.0	--	248.2	1467	--	260.3	2957	--	552.5
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..	65	15	2.6	124	38	13	54	--	2
2..	117	13	4.1	110	14	4.2	53	--	2
3..	168	20	9.1	98	17	4.5	48	--	2
4..	159	23	9.9	98	34	9.0	50	--	2
5..	117	24	7.6	212	190	A 110	48	--	2
6..	104	20	5.6	1300	550	A 1900	46	--	2
7..	98	26	6.9	595	162	S 279	46	--	2
8..	81	24	5.2	375	71	72	40	--	2
9..	61	22	3.6	504	88	S 127	41	--	2
10..	61	21	3.4	1710	1120	S 5490	42	--	2
11..	61	23	3.8	840	--	700	42	--	2
12..	64	24	4.1	350	65	61	40	--	2
13..	299	496	S 451	250	53	36	36	--	2
14..	260	259	182	197	54	29	37	--	2
15..	490	405	S 563	159	29	12	40	--	2
16..	392	226	239	144	22	8.6	47	--	2
17..	231	178	111	130	17	6.0	51	--	2
18..	205	230	127	110	10	3.0	48	--	2
19..	182	200	98	92	12	3.0	53	--	2
20..	144	91	35	81	14	3.1	59	--	2
21..	117	44	14	87	14	3.3	64	--	3
22..	105	39	11	74	18	3.6	72	15	2.9
23..	90	30	7.3	76	20	4.1	80	14	3.0
24..	81	29	6.3	70	18	3.4	92	12	3.0
25..	76	36	7.4	61	19	3.1	74	11	2.2
26..	70	40	7.6	56	13	2.0	92	19	4.7
27..	200	499	S 358	58	13	2.0	450	234	S 451
28..	261	795	560	57	15	2.3	1060	362	1040
29..	166	336	150	56	--	2	700	262	495
30..	137	54	20	--	--	--	490	122	161
31..	124	23	7.7	--	--	--	430	68	79
Total	4786	--	3021.2	8074	--	8896.2	4525	--	2284.8

S Computed by subdividing day.

A Computed from partly estimated concentration graph.

WABASH RIVER BASIN--Continued  
3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--Continued

Suspended sediment, water year October 1959 to September 1960--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..	300	58	47	166	27	12	87	42	9.9
2..	250	54	36	110	23	6.8	70	33	6.2
3..	197	44	23	81	9	2.0	76	22	4.5
4..	166	39	17	65	5	.9	56	28	4.2
5..	152	33	14	58	13	2.0	44	29	3.4
6..	137	22	8.1	59	13	2.1	37	17	1.7
7..	124	27	9.0	130	27	9.5	31	22	1.8
8..	104	30	8.4	104	17	4.8	27	47	3.4
9..	92	24	6.0	87	14	3.3	25	52	3.5
10..	81	17	3.7	87	17	4.0	22	28	1.7
11..	76	17	3.5	98	12	3.2	22	23	1.4
12..	76	19	3.9	92	7	1.7	31	22	1.8
13..	70	20	3.8	81	7	1.5	38	27	2.8
14..	65	22	3.9	76	9	1.8	32	22	1.9
15..	61	21	3.4	61	12	2.0	29	25	2.0
16..	76	28	5.7	57	26	4.0	25	24	1.6
17..	104	25	7.0	70	16	3.0	26	25	1.8
18..	92	26	6.4	61	9	1.5	25	25	1.7
19..	70	26	4.9	55	7	1.0	21	19	1.1
20..	61	25	4.1	61	7	1.2	19	20	1.0
21..	61	13	2.1	58	9	1.4	51	180	A 25
22..	57	22	3.4	70	11	2.1	65	119	21
23..	51	20	2.8	65	14	2.4	2490	1690	S 13100
24..	48	17	2.2	56	15	2.3	1350	524	S 2150
25..	46	13	1.6	53	7	1.0	430	238	S 296
26..	57	34	5.2	91	47	12	260	122	86
27..	53	29	4.1	65	18	3.2	189	96	49
28..	43	20	2.3	58	20	3.1	214	81	47
29..	44	14	1.7	52	19	2.7	159	113	48
30..	87	16	3.8	125	92	31	124	102	34
31..	--	--	--	124	30	10	--	--	--
Total	2901	--	248.0	2476	--	139.5	6075	--	15913.4
	JULY			AUGUST			SEPTEMBER		
1..	104	75	21	15	29	1.2	10	57	1.5
2..	87	51	12	14	58	2.2	9.5	34	.9
3..	76	32	6.6	41	248	45	9.0	26	.6
4..	65	27	4.7	47	263	30	8.8	52	1.2
5..	53	19	2.7	25	54	3.6	8.5	82	1.9
6..	45	9	1.1	18	30	1.4	8.5	56	1.5
7..	42	16	1.8	17	25	1.1	8.5	61	1.4
8..	38	17	1.7	15	44	1.8	8.2	52	1.2
9..	32	12	1.0	14	36	1.4	9.0	47	1.1
10..	36	16	1.6	13	26	.9	8.8	56	1.3
11..	42	11	1.2	13	31	1.1	8.8	49	1.2
12..	38	44	4.5	12	38	1.2	9.2	41	1.0
13..	405	626	S 1470	12	34	1.1	9.2	48	1.2
14..	678	528	S 1210	11	30	.9	8.8	45	1.1
15..	247	92	61	11	25	.7	8.8	66	1.6
16..	159	58	25	11	9	.3	8.8	54	1.3
17..	110	36	11	11	25	.7	8.5	64	1.5
18..	87	27	6.3	11	34	1.0	9.2	57	1.4
19..	65	26	4.6	10	37	1.0	12	85	2.7
20..	53	23	3.3	11	44	1.3	10	68	1.8
21..	44	25	3.0	11	42	1.2	9.5	67	1.7
22..	37	27	2.7	10	38	1.0	9.0	53	1.3
23..	32	27	2.3	10	26	.7	8.5	44	1.0
24..	30	20	1.6	9.5	19	.5	8.0	47	1.0
25..	27	33	2.4	9.5	28	.7	8.0	40	.9
26..	26	27	1.9	9.2	49	1.2	7.8	46	1.0
27..	25	19	1.3	9.2	56	1.4	7.5	33	.7
28..	23	21	1.3	9.0	48	1.2	7.3	35	.7
29..	20	19	1.0	8.8	50	1.2	6.8	41	.8
30..	18	19	.9	11	49	1.4	6.6	40	.7
31..	16	26	1.1	11	47	1.4	--	--	--
Total	2760	--	2870.6	440.2	--	109.8	261.1	--	37.2
Total discharge for year (cfs-days).....									37352.3
Total load for year (tons).....									34581.7

S Computed by subdividing day.

A Computed from partly estimated concentration graph.

## WABASH RIVER BASIN--Continued

3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--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..	6.4	35	0.6	8.0	15	0.3	8.5	27	0.6
2..	6.4	35	.6	5.3	10	.1	7.5	18	.4
3..	6.2	34	.6	6.2	10	.2	7.3	10	.2
4..	6.0	48	.8	6.8	7	.1	7.1	10	.2
5..	5.7	54	.8	6.8	12	.2	7.5	10	.2
6..	5.5	50	.7	6.8	14	.2	10	10	.3
7..	5.1	50	.7	6.8	10	.2	12	15	.5
8..	4.9	50	.7	7.5	12	.2	12	15	.5
9..	4.8	22	.3	8.8	18	.4	10	14	.4
10..	4.6	16	.2	8.8	15	.4	9.0	12	.3
11..	4.4	18	.2	8.0	7	.2	8.7	6	.1
12..	4.2	16	.2	7.5	7	.1	8.4	3	.1
13..	4.0	18	.2	7.5	10	.2	8.2	4	.1
14..	4.2	17	.2	7.5	13	.3	7.9	3	.1
15..	4.4	15	.2	11	14	.4	7.7	5	.1
16..	4.4	16	.2	14	39	1.5	7.5	3	.1
17..	4.8	16	.2	12	35	1.1	7.3	3	.1
18..	5.1	15	.2	10	20	.5	7.1	6	.1
19..	6.2	18	.3	9.2	9	.2	7.0	7	.1
20..	7.3	17	.3	8.5	7	.2	6.8	9	.2
21..	6.6	18	.3	8.0	10	.2	6.7	10	.2
22..	6.6	15	.3	8.0	17	.4	7.0	10	.2
23..	6.4	8	.1	7.8	14	.3	7.1	6	.1
24..	6.2	8	.1	7.8	6	.1	8.0	9	.2
25..	6.2	12	.2	7.3	8	.2	9.0	9	.2
26..	7.3	14	.3	7.1	13	.2	10	9	.2
27..	9.0	18	.4	7.1	12	.2	11	8	.2
28..	9.2	20	.5	8.2	12	.3	12	9	.3
29..	9.0	15	.4	11	22	.6	12	10	.3
30..	8.8	20	.5	9.8	26	.7	11	10	.3
31..	9.5	25	.6	--	--	--	10	12	.3
Total	189.4	--	11.9	249.1	--	10.2	271.3	--	7.2
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..	9.4	21	0.5	7.7	27	0.6	189	246	126
2..	8.8	21	.5	7.9	30	.6	205	430	238
3..	8.7	17	.4	8.1	28	.6	214	715	413
4..	8.5	16	.4	8.3	30	.7	174	690	324
5..	8.8	14	.3	8.5	12	.3	197	565	300
6..	9.2	10	.2	8.7	10	.2	322	714	5
7..	9.5	11	.3	8.9	11	.3	355	930	891
8..	9.7	15	.4	9.2	9	.2	300	472	5
9..	10	10	.3	9.8	8	.2	400	1850	2000
10..	9.9	13	.3	12	7	.2	260	545	382
11..	9.8	16	.4	17	10	.4	197	142	76
12..	9.7	27	.7	21	10	.6	225	191	5
13..	10	25	.7	29	12	.9	1880	1090	5530
14..	14	17	.6	40	9	1.0	934	432	5
15..	25	28	1.9	34	7	.6	490	357	472
16..	40	27	2.9	28	11	.8	300	320	259
17..	42	20	2.3	33	18	1.6	222	132	5
18..	35	13	1.2	76	15	3.1	234	115	5
19..	29	15	1.2	87	5	1.2	865	441	1030
20..	23	12	.7	57	4	.6	520	197	276
21..	18	10	.4	44	4	.5	640	382	660
22..	15	10	.4	38	4	.4	520	280	393
23..	13	5	.2	38	8	.8	400	106	114
24..	11	9	.1	35	9	.8	300	70	57
25..	10	9	.2	35	10	.9	231	37	23
26..	9.2	12	.3	29	9	.7	197	47	25
27..	8.3	18	.4	35	15	1.4	174	43	20
28..	7.8	25	.5	108	79	23	144	23	8.9
29..	7.5	15	.3	--	--	--	117	29	9.1
30..	7.5	15	.3	--	--	--	104	29	8.1
31..	7.5	13	.3	--	--	--	98	31	8.2
Total	444.8	--	19.6	873.1	--	43.2	11408	--	16340.3

S Computed by subdividing day.

## WABASH RIVER BASIN--Continued

3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--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..	98	32	8.5	231	21	13	45	38	4.6
2..	81	29	6.3	182	35	17	41	33	3.6
3..	70	17	3.2	159	38	16	38	21	2.1
4..	65	16	2.8	130	34	12	33	20	1.8
5..	61	18	3.0	124	26	8.7	30	16	1.3
6..	57	12	1.8	223	54	32	35	30	3
7..	52	11	1.5	240	30	19	52	45	6.3
8..	48	16	2.1	2830	1860	S 18200	62	19	3.2
9..	56	19	2.9	2460	700	S 5090	437	1220	S 3580
10..	81	18	3.9	940	178	444	492	1110	S 1880
11..	70	14	2.6	520	210	295	197	95	50
12..	76	160	S 38	325	230	202	130	79	28
13..	124	418	140	240	97	63	92	87	22
14..	110	136	40	189	107	55	158	172	S 94
15..	98	40	10	182	212	104	212	80	S 54
16..	124	38	13	144	99	38	124	24	8.0
17..	182	304	149	117	77	24	87	37	8.7
18..	598	641	S 1230	110	66	20	65	34	6.0
19..	580	1200	S 1980	92	56	14	55	27	4.0
20..	325	507	445	87	52	12	48	27	3.5
21..	222	130	78	81	32	7.0	46	22	2.7
22..	755	1330	S 4410	70	26	4.9	41	37	4.1
23..	980	1830	4840	65	21	3.7	113	--	19
24..	460	950	1180	60	25	4.0	110	25	7.4
25..	2130	4700	S 35800	58	29	4.5	65	33	5.8
26..	1970	2040	S 12900	61	34	5.6	47	25	3.2
27..	580	510	799	53	31	4.4	39	17	1.8
28..	580	119	186	50	34	4.6	33	16	1.4
29..	400	52	56	49	38	5.0	29	11	.9
30..	280	52	39	44	31	3.7	26	12	.8
31..	--	--	--	34	33	3.0	--	--	--
Total	11253	--	64371.6	10159	--	24729.1	2982	--	5811.2
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..	24	19	1.2	82		55	12	67	2.2
2..	23	27	1.7	147		60	12	69	2.2
3..	22	10	.6	49		5	12	47	1.5
4..	23	22	1.4	27		2	12	23	.7
5..	23	24	1.5	21		2	11	20	.6
6..	22	35	2.1	17		1	11	19	.6
7..	20	20	1.1	15		1	11	25	.7
8..	18	15	.7	14		.9	10	24	.6
9..	17	22	1.0	12		.8	10	24	.6
10..	16	20	.9	12		.8	10	24	.6
11..	15	15	.6	89		40	9.8	20	.5
12..	15	22	.9	36		4	9.8	19	.5
13..	15	22	.9	20		2	10	24	.6
14..	15	23	.9	15		1	12	23	.7
15..	16	14	.6	13		.9	11	22	.6
16..	15	16	.6	12		.8	11	22	.6
17..	15	25	1.0	11		.7	10	17	.4
18..	14	20	.8	11		.7	10	17	.4
19..	14	17	.6	11		.7	10	13	.4
20..	14	12	.4	224		155	10	20	.5
21..	15	13	.5	71		13	9.8	30	.8
22..	92	71	S 22	35		3	10	34	.9
23..	47	41	5.2	24		2	10	28	.8
24..	32	32	2.8	27		2	10	31	.8
25..	28	31	2.3	61		11	421	711	S 1040
26..	19	35	1.8	42		5	223	320	193
27..	15	32	1.3	26		3	98	190	50
28..	14	20	.8	19		2	52	110	15
29..	13	16	.6	16		2	36	45	4.1
30..	26	24	1.7	14		2	26	67	4.7
31..	21	24	1.4	13		2	--	--	--
Total	678	--	59.9	1186		381.3	1108.4	--	1325.6

Total discharge for year (cfs-days)..... 40802.1  
 Total load for year (tons)..... 113111.1

S Computed by subdividing day.

B Computed from estimated concentration graph.

## WABASH RIVER BASIN--Continued

3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--Continued

Suspended sediment, water year October 1961 to September 1962

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..	26	23	2	65	20	4	60	31	5
2..	25	22	1	49	23	3	56	24	5
3..	22	20 B	1	53	29	A 4	51	24	4
4..	21	19 B	1	185	--	E 65	51	26	4
5..	18	19 B	1	137	--	E 30	87	27	6
6..	17	18 B	1	92	17	4	92	39	10
7..	16	19 B	1	70	10	2	76	42	9
8..	15	19 B	1	58	14	2	58	31	5
9..	15	20 B	1	49	14	2	53	34	5
10..	14	19 B	1	43	12	1	58	34	5
11..	15	19 B	1	39	14	1	56	28	4
12..	16	20 B	1	35	16	2	76	45	9
13..	26	44 A	3	33	14	1	92	32	8
14..	33	62	6	33	12	1	79	37	8
15..	26	32	2	34	10	1	65	35	6
16..	22	23	1	386	2770 S	5550	61	41	7
17..	21	26	1	430	3480 S	4820	87	42	10
18..	19	25	1	222	675	404	92	44	11
19..	19	25	1	159	468	201	101	92	25
20..	19	25	1	124	323	108	205	89	49
21..	19	25	1	92	357	89	137	40	15
22..	18	23	1	92	204	51	110	134	40
23..	18	24	2	256	264 S	196	223	299	180
24..	22	28	2	231	293	183	222	186	111
25..	140	1180 S	470	159	201	86	152	90	37
26..	92	720	179	130	125	44	110	50	15
27..	57	250	38	110	82	24	90	42	10
28..	42	40	4	87	71	17	70	52	10
29..	38	22	2	76	68	14	66	45	8
30..	36	21	2	65	48	8	64	37	6
31..	66	28	5	--	--	--	62	46	8
Total	953	--	735	3594	--	11918	2862	--	633
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..	61	25	4	182	134	66	250	220	148
2..	61	27	4	137	68	25	205	159	88
3..	61	41	7	130	54	19	174	106	50
4..	65	48	8	130	44	15	159	105	45
5..	91	50	12	189	72	37	137	116	43
6..	463	260 A	320	130	35	12	124	102	34
7..	670	160 A	290	124	38	13	117	142	45
8..	300	96	78	110	39	12	117	40	13
9..	160	56	24	104	32	9	214	190	110
10..	130	73	26	87	13	3	318	230 A	200
11..	120	60	19	81	10	2	245	104 S	95
12..	120	62	20	87	10	2	610	3500	5760
13..	110	59	18	87	9	2	400	645	697
14..	110	20	6	92	6	1	300	180	146
15..	543	479 S	882	81	11	2	240	37	24
16..	610	198	326	76	5	1	214	32	18
17..	350	65	61	76	5	1	189	38	19
18..	240	99	64	76	15	3	174	29	14
19..	210	104	59	130	254	89	214	20	12
20..	197	67	36	110	70	21	305	65 S	79
21..	189	73	37	92	42	10	3910	19100 S	260000
22..	265	85	61	166	182	82	1370	5840 S	34400
23..	300	116	94	159	106	46	520	317	420
24..	231	122	76	110	67	20	375	233	178
25..	222	97	58	117	50	16	280	162	115
26..	6430	1670 S	45400	1350	1090 S	5160	222	112	40
27..	4520	2470	30100	811	898 S	2220	182	87	43
28..	640	1720	2970	375	318	322	159	78	33
29..	375	1340	1360	--	--	--	137	71	26
30..	280	320	242	--	--	--	130	65	23
31..	205	210	116	--	--	--	117	60	19
Total	18329	--	82778	5399	--	8211	12108	--	302937

E Estimated.

S Computed by subdividing day.

A Computed from partly estimated concentration graph.

B Computed from estimated concentration graph.

## WABASH RIVER BASIN--Continued

3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--Continued

Suspended sediment, water year October 1961 to September 1962--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..	110	57	17	245	1070	S 766	187	--	E 300
2..	104	53	15	300	1560	1260	98	120	B 30
3..	92	47	12	240	455	295	65	100	B 18
4..	87	38	9	152	295	121	53	110	16
5..	98	28	7	110	44	13	73	347	S 77
6..	98	23	6	92	21	5	180	1740	S 929
7..	92	21	5	81	20	4	65	1280	225
8..	92	23	6	217	1750	S 1170	45	310	38
9..	152	62	25	189	1340	684	65	200	35
10..	152	36	15	152	1710	S 911	87	230	B 55
11..	117	28	9	430	5070	S 2920	52	105	15
12..	104	21	6	280	3780	2860	42	61	7
13..	110	25	7	189	1620	827	37	60	6
14..	98	18	5	144	420	163	31	46	4
15..	87	20	5	104	360	101	27	31	2
16..	76	26	5	87	297	70	25	30	2
17..	70	26	5	76	70	14	22	37	2
18..	70	25	5	92	27	7	21	48	3
19..	65	25	4	70	22	4	22	45	3
20..	61	22	4	59	27	4	21	48	3
21..	57	31	5	64	178	S 48	19	42	2
22..	57	31	5	152	2730	1120	18	42	2
23..	57	17	3	87	340	S 88	17	33	2
24..	52	12	2	59	470	75	17	41	2
25..	50	10	1	48	220	28	16	46	2
26..	49	15	2	65	1160	S 260	16	49	2
27..	48	14	2	265	2880	S 2210	14	46	2
28..	47	12	2	335	1590	1440	13	41	1
29..	47	14	2	152	900	369	13	40	1
30..	50	20	3	98	440	116	12	38	1
31..	--	--	--	76	260	53	--	--	--
Total	2449	--	199	4710	--	18006	1373	--	1787
JULY				AUGUST			SEPTEMBER		
1..	13	45	1	22	51	3	10	20	1
2..	15	51	2	20	28	2	10	24	1
3..	14	52	2	18	19	1	9.8	30	1
4..	16	32	1	17	19	1	11	28	1
5..	19	41	2	15	33	1	10	25	1
6..	15	37	1	19	26	1	9.5	23	1
7..	13	34	1	25	27	2	9.0	26	1
8..	12	30	1	26	40	3	8.8	42	1
9..	12	24	1	17	36	2	9.0	34	1
10..	11	15	7	15	35	1	9.2	19	7
11..	11	20	1	14	41	2	9.0	20	7
12..	12	24	1	12	34	1	8.8	17	7
13..	13	32	1	12	35	1	8.8	22	1
14..	2870	4640	S 45400	11	55	2	492	1260	S 2740
15..	2150	5720	S 34800	11	45	1	87	250	59
16..	700	2820	S 5780	10	62	2	44	234	28
17..	325	2220	1950	10	28	1	28	66	5
18..	205	3080	1700	9.5	21	1	22	35	2
19..	137	1700	629	9.2	26	1	20	26	1
20..	98	195	52	8.8	35	1	18	20	1
21..	87	80	19	8.8	36	1	17	25	1
22..	144	2640	S 1470	8.8	26	1	17	32	1
23..	189	1200	600	8.5	26	1	16	26	1
24..	137	480	180	8.2	32	1	16	29	1
25..	87	120	28	8.8	35	1	16	22	1
26..	61	42	7	15	--	E 3	16	27	1
27..	48	42	5	45	--	E 14	16	26	1
28..	38	42	4	22	48	3	16	27	1
29..	33	43	4	14	36	1	15	27	1
30..	29	49	4	12	31	1	15	25	1
31..	25	43	3	11	32	1	--	--	--
Total	7539	--	92650	463.6	--	58	993.9	--	2857
Total discharge for year (cfs-days).....									
Total load for year (tons).....									

E Estimated.

S Computed by subdividing day.

B Computed from estimated concentration graph.

## WABASH RIVER BASIN--Continued

3-3408. RACCOON CREEK NEAR FINCASTLE, IND.--Continued

Suspended sediment, water year October 1962 to September 1963  
(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..	15	40	2	28	--	3	22	--	3
2..	16	28	1	27	--	3	21	--	2
3..	19	42	2	26	--	3	21	--	3
4..	16	55	2	24	--	4	20	--	3
5..	16	51	2	25	--	4	20	60	3
6..	16	52	2	24	--	4	21	47	3
7..	19	50	2	23	--	4	19	38	2
8..	19	43	2	23	83	5	19	40	2
9..	19	27	1	23	80	5	19	60	3
10..	19	26	1	22	70	4	15	43	2
11..	19	23	1	21	69	4	14	25	1
12..	21	31	2	23	80	5	14	22	1
13..	70	--	55	23	92	6	14	22	1
14..	447	2300	A	23	82	5	14	23	1
15..	156	650	274	21	70	4	14	27	1
16..	94	397	101	25	66	4	14	22	1
17..	69	214	40	58	87	14	15	27	1
18..	51	167	23	76	110	22	16	30	1
19..	41	204	22	60	92	15	18	30	1
20..	75	--	170	48	90	12	21	38	2
21..	245	2400	A	44	94	11	20	57	3
22..	164	850	376	40	93	10	19	85	4
23..	101	550	150	34	63	6	17	80	4
24..	71	252	48	28	70	5	16	65	3
25..	57	--	12	27	72	5	15	70	3
26..	48	--	7	24	50	3	14	63	2
27..	41	--	4	23	--	2	14	85	3
28..	37	--	4	23	--	3	13	97	3
29..	35	--	4	23	--	3	13	88	3
30..	31	--	4	23	--	3	12	57	2
31..	30	--	3	--	--	--	12	47	2
Total	2077	--	5717	912	--	181	516	--	69
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..	12	28	1	12	7	T	13	6	T
2..	12	47	2	13	7	T	13	4	T
3..	13	27	1	13	8	T	60	161	S 68
4..	14	21	1	13	8	T	4000	4170	S 51200
5..	15	20	1	14	8	T	4570	1740	S 25700
6..	15	19	1	60	12	2	1110	606	S 2490
7..	15	19	1	140	27	10	342	86	79
8..	15	19	1	66	15	3	236	55	35
9..	16	18	1	47	14	2	485	164	S 260
10..	23	23	1	36	14	1	431	175	S 220
11..	60	118	S 23	28	13	1	245	87	58
12..	110	165	49	25	15	1	208	67	38
13..	60	97	16	23	12	1	283	95	72
14..	46	75	9	20	14	1	245	70	46
15..	40	35	4	19	18	1	182	51	25
16..	35	20	2	17	18	1	253	--	75
17..	30	20	2	15	22	1	570	190	A 290
18..	25	21	1	19	26	1	363	59	58
19..	22	20	1	26	24	2	870	349	S 875
20..	19	12	1	33	12	1	600	--	340
21..	18	7	T	25	10	1	322	78	68
22..	17	7	T	20	9	T	236	170	108
23..	16	7	T	17	10	T	190	150	77
24..	16	8	T	16	6	T	164	123	54
25..	15	9	T	15	11	T	148	117	47
26..	14	9	T	14	6	T	320	105	91
27..	13	8	T	14	6	T	384	110	114
28..	13	8	T	13	8	T	264	92	66
29..	12	10	T	--	--	--	217	83	49
30..	12	8	T	--	--	--	182	40	20
31..	12	9	T	--	--	--	550	700	B 1000
Total	755	--	122	773	--	34	18056	--	83623

S Computed by subdividing day.

T Less than 0.5 ton.

A Computed from partly estimated concentration graph.

B Computed from estimated concentration graph.



## WABASH RIVER BASIN--Continued

## 3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--Continued

Suspended sediment, water year October 1962 to September 1963--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..	1100	1080	S 3460	384	--	1000	24	55	4
2..	540	498	726	264	750	535	23	63	4
3..	363	--	320	208	620	348	21	46	3
4..	322	--	130	164	150	66	20	41	2
5..	245	--	35	139	57	21	19	52	3
6..	199	--	17	116	43	13	19	55	3
7..	164	--	13	101	41	11	19	55	3
8..	139	--	10	88	52	12	28	54	4
9..	116	--	12	76	36	7	41	49	5
10..	94	--	13	70	31	6	26	65	4
11..	82	--	12	65	42	7	27	70	5
12..	76	--	11	60	35	6	28	72	5
13..	69	--	12	64	30	5	27	74	5
14..	64	96	16	61	21	3	27	68	5
15..	58	83	13	53	20	3	23	67	4
16..	56	74	11	51	27	4	23	62	4
17..	61	93	15	57	28	4	19	25	1
18..	69	93	17	57	25	4	19	5	7
19..	137	115	42	45	39	5	17	7	7
20..	322	125	109	44	10	1	17	10	7
21..	208	101	57	39	18	2	16	5	7
22..	500	550	A 750	35	6	1	15	5	7
23..	940	1200	A 3000	31	6	1	15	12	7
24..	481	870	1130	31	12	1	14	27	1
25..	322	480	417	28	10	1	13	29	1
26..	245	150	99	27	22	2	13	12	7
27..	190	71	36	35	52	5	13	20	1
28..	156	47	20	66	304	54	12	32	1
29..	242	202	S 156	43	170	20	12	31	1
30..	630	1940	S 3140	31	80	7	11	28	1
31..	--	--	--	27	46	3	--	--	--
Total	8190	--	13799	2560	--	2158	601	--	72
	JULY			AUGUST			SEPTEMBER		
1..	12	34	1	11	--	2	11	36	1
2..	65	70	A 12	9.8	50	1	9.0	60	1
3..	36	22	2	9.0	36	1	9.0	61	1
4..	19	22	1	8.4	15	7	9.0	43	1
5..	13	28	1	7.8	16	7	8.4	51	1
6..	27	31	2	12	8	7	7.8	52	1
7..	22	32	2	141	--	180	7.2	61	1
8..	18	34	2	90	148	S 40	7.2	63	1
9..	12	33	1	44	--	12	7.2	55	1
10..	9.8	28	1	49	160	21	6.6	55	1
11..	7.8	28	1	23	121	8	6.6	60	1
12..	7.2	21	7	18	102	5	6.6	56	1
13..	11	15	7	15	85	3	6.1	40	1
14..	14	20	1	12	80	2	6.1	50	1
15..	12	33	1	11	47	1	5.1	70	1
16..	11	37	1	9.0	57	1	5.1	65	1
17..	9.8	31	1	8.4	63	1	5.1	63	1
18..	7.8	31	1	7.8	60	1	4.6	37	7
19..	7.8	31	1	74	--	55	4.6	63	1
20..	301	1460	S 1490	280	300	A 230	4.6	78	1
21..	161	538	S 250	108	--	40	4.1	72	1
22..	138	334	S 141	53	85	12	4.1	73	1
23..	136	380	A 140	32	65	6	4.1	72	1
24..	110	238	S 74	24	63	4	4.1	76	1
25..	45	--	15	20	59	3	4.1	70	1
26..	19	--	4	18	46	2	4.1	69	1
27..	20	--	7	15	36	1	3.7	77	1
28..	17	--	4	15	44	2	4.1	80	1
29..	15	67	3	14	87	3	3.7	79	1
30..	13	--	2	12	82	3	3.3	87	1
31..	11	--	2	11	58	2	--	--	--
Total	1308.2	--	2165	1162.2	--	643	176.3	--	29

Total discharge for year (cfs-days)..... 37086.7

Total load for year (tons)..... 108612

S Computed by subdividing day.

T Less than 0.5 ton.

A Computed from partly estimated concentration graph.

## WABASH RIVER BASIN--Continued

3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--Continued

Suspended sediment, water year October 1963 to September 1964  
(Where no concentrations are reported, loads are estimated)

Day	Mean discharge (cfs)	OCTOBER		NOVEMBER			DECEMBER		
		Suspended sediment		Suspended sediment			Suspended sediment		
		Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	3.0	80	1	6.6	7	T	5.6	3	T
2..	2.7	54	T	5.6	6	T	5.6	5	T
3..	2.7	27	T	5.6	7	T	5.6	5	T
4..	2.4	25	T	4.6	5	T	5.6	5	T
5..	2.4	23	T	6.1	5	T	5.6	6	T
6..	2.7	21	T	6.1	4	T	5.6	5	T
7..	2.7	20	T	5.6	4	T	5.6	4	T
8..	3.0	15	T	5.1	4	T	7.8	7	T
9..	2.7	20	T	4.6	5	T	7.8	8	T
10..	2.7	18	T	4.1	5	T	7.2	10	T
11..	3.0	10	T	4.1	5	T	6.6	13	T
12..	4.1	11	T	3.7	6	T	5.8	12	T
13..	4.6	18	T	3.7	17	T	5.4	24	T
14..	5.1	13	T	4.1	20	T	5.0	26	T
15..	5.1	13	T	4.1	16	T	4.5	15	T
16..	5.6	13	T	3.7	11	T	4.2	7	T
17..	5.6	10	T	3.3	14	T	4.0	13	T
18..	6.6	11	T	3.3	11	T	3.8	16	T
19..	8.4	13	T	3.3	10	T	3.7	26	T
20..	8.4	10	T	3.7	10	T	3.6	23	T
21..	7.8	10	T	3.7	11	T	3.6	22	T
22..	7.8	9	T	6.6	12	T	3.6	18	T
23..	7.2	10	T	13	10	T	3.6	12	T
24..	6.6	10	T	14	10	T	3.7	15	T
25..	6.1	13	T	11	11	T	3.8	25	T
26..	6.1	14	T	9.8	14	T	4.0	33	T
27..	6.1	12	T	7.8	14	T	4.2	27	T
28..	5.6	14	T	7.2	8	T	4.5	24	T
29..	5.6	13	T	6.6	5	T	4.5	23	T
30..	5.1	13	T	6.1	5	T	4.5	20	T
31..	5.6	16	T	--	--	--	4.2	18	T
Total	153.1	--	7	176.8	--	5	152.8	--	6
Day	Mean discharge (cfs)	JANUARY		FEBRUARY			MARCH		
		Suspended sediment		Suspended sediment			Suspended sediment		
		Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	4.0	10	T	20	36	2	32	62	5
2..	4.0	16	T	19	26	1	164	111	49
3..	4.0	16	T	19	19	1	173	--	30
4..	4.2	16	T	19	18	1	240	--	90
5..	4.5	11	T	19	17	1	660	511	911
6..	5.0	6	T	36	18	2	342	366	338
7..	6.0	8	T	67	52	9	236	250	159
8..	8.0	30	T	50	55	7	344	306	940
9..	20	460	25	46	46	6	4890	4800	69500
10..	14	565	21	35	36	3	1920	1350	7000
11..	10	222	6	28	24	2	870	1410	3310
12..	8.0	124	3	26	15	1	840	866	1960
13..	7.7	80	2	26	14	1	810	874	1910
14..	7.4	51	1	24	14	1	690	615	1140
15..	7.2	83	2	23	17	1	428	495	572
16..	7.0	56	1	25	38	2	329	403	358
17..	7.0	57	1	23	19	1	239	325	210
18..	7.0	67	1	23	21	1	179	260	126
19..	15	60	2	23	21	1	135	221	80
20..	110	550	160	23	22	1	127	266	91
21..	70	227	43	23	24	1	131	212	75
22..	60	137	22	22	30	2	105	178	50
23..	52	96	13	21	30	2	88	172	41
24..	50	66	9	20	24	1	81	--	35
25..	140	--	330	20	20	1	133	--	1100
26..	70	128	24	20	26	1	353	2420	2310
27..	50	114	15	20	38	2	219	1470	869
28..	35	85	8	20	41	2	179	1010	488
29..	28	123	9	20	41	2	149	720	290
30..	25	118	8	--	--	--	114	807	248
31..	22	70	4	--	--	--	106	552	158
Total	862	--	712	760	--	59	15306	--	94443

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed from partly estimated-concentration graph.

## WABASH RIVER BASIN--Continued

3-3408. BIG RACCOON CREEK NEAR FINCASTLE, IND.--Continued

Suspended sediment, water year October 1963 to September 1964--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..	85	479	110	250	19	13	23	32	2
2..	88	535	127	199	15	8	23	31	2
3..	811	1030	2410	159	8	3	27	30	2
4..	570	662	1020	127	10	3	23	30	2
5..	403	279	304	106	12	3	20	29	2
6..	630	1150	1960	91	8	2	23	29	2
7..	447	556	671	82	22	5	23	28	2
8..	283	231	176	77	19	4	21	27	2
9..	209	198	112	69	15	3	20	26	1
10..	159	168	72	61	13	2	17	25	1
11..	121	140	46	57	19	3	16	25	1
12..	99	121	32	64	27	5	17	25	1
13..	90	106	26	59	19	3	19	25	1
14..	69	107	20	53	15	2	19	25	1
15..	52	108	15	47	15	2	18	25	1
16..	45	113	14	70	--	190	16	24	1
17..	40	111	12	264	1700	A 1200	15	23	1
18..	40	85	9	90	660	160	14	22	1
19..	838	879	S 2740	61	230	38	13	21	1
20..	3430	3840	S 57400	76	201	S 47	22	222	S 18
21..	7650	8380	S 181000	60	108	17	461	2740	S 3960
22..	1550	3590	S 15900	47	70	9	356	2090	2010
23..	690	2840	5290	41	53	6	159	1330	571
24..	630	1600	2720	37	43	4	84	900	204
25..	428	1320	1520	35	34	3	58	564	88
26..	305	1240	1020	31	27	2	42	352	40
27..	666	--	7600	32	25	2	34	259	24
28..	720	2980	5790	31	31	2	29	169	13
29..	428	802	927	27	36	3	24	117	8
30..	329	199	177	26	35	2	21	106	6
31..	--	--	--	24	32	2	--	--	--
Total	21905	--	289220	2453	--	1748	1657	--	6969
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..	19	101	5	6.1	33	1	12	30	1
2..	16	98	4	5.8	52	1	6.4	26	T
3..	16	94	4	5.6	58	1	4.8	19	T
4..	17	82	4	5.1	44	1	3.6	16	T
5..	16	62	3	4.5	34	T	3.2	17	T
6..	16	55	2	4.2	38	T	2.8	11	T
7..	17	54	2	4.0	37	T	2.6	8	T
8..	19	54	3	4.0	35	T	2.4	12	T
9..	19	53	3	3.8	32	T	2.2	12	T
10..	16	53	2	3.8	28	T	2.2	10	T
11..	14	52	2	3.8	46	T	2.2	13	T
12..	14	51	2	4.8	66	1	2.2	11	T
13..	13	51	2	3.6	57	1	2.2	9	T
14..	15	50	2	3.2	60	1	2.2	10	T
15..	17	50	2	3.8	63	1	1.9	6	T
16..	16	50	2	4.0	64	1	1.8	8	T
17..	36	--	15	3.8	64	1	1.8	15	T
18..	29	70	5	3.8	62	1	2.8	18	T
19..	19	50	2	3.8	68	1	3.6	18	T
20..	14	50	2	3.8	61	1	3.6	17	T
21..	12	50	2	4.2	54	1	3.2	16	T
22..	11	49	1	4.8	52	1	4.2	16	T
23..	9.8	50	1	4.8	50	1	5.1	15	T
24..	9.4	58	1	4.5	48	1	3.6	15	T
25..	7.4	56	1	4.2	46	1	3.0	15	T
26..	7.0	54	1	4.2	45	1	2.8	15	T
27..	6.7	51	1	4.0	43	T	3.2	15	T
28..	6.1	48	1	4.2	41	T	3.2	15	T
29..	5.8	46	1	4.5	39	T	2.8	15	T
30..	5.6	48	1	5.1	38	1	2.8	15	T
31..	6.4	36	1	6.7	34	1	--	--	--
Total	445.2	--	80	136.5	--	25	100.4	--	5

Total discharge for year (cfs-days)..... 44107.8  
 Total load for year (tons)..... 393279

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed from partly estimated-concentration graph.

## WABASH RIVER BASIN--Continued

3-3418.5. WABASH RIVER NEAR SULLIVAN, IND.

LOCATION--At intake line to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at Breed Generating Plant of the Indiana-Michigan Electric Company

Drainage area, 12,600 square miles, approximately.

RECORDS AVAILABLE--Chemical analyses: July 1963 to September 1964.

Water temperatures: July 1963 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 817 micromhos Jan. 3; minimum daily, 263 micromhos Apr. 25.

Water temperatures: Maximum, 85°F July 25, 28, 29, Aug. 3, 4; minimum, not determined.

REMARKS.--Daily samples were collected at this station and records of specific conductance of daily samples available in district office at Columbus, Ohio.

Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September). No samples collected at this station Dec. 14-31, Jan. 14-28, Feb. 10-29, Mar. 1-6, Aug. 22-31, Sept. 1-11. No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl Sulfate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		To-Specific conductance (micro-mhos at 25°C)	pH or Col.	Detergent (MB or AS)		
																		Calcium, carbonate	Non-carbonate					
Oct. 1, 1963.						68	28				278	0	82	18		0.4		380	285	56	614	6.8		
Oct. 5.													83				0.56				640	7.4	0.1	
Oct. 20.						71	26				292	0	85	26		2.9	.62		420	284	45	656	7.0	.1
Oct. 28.																					677	7.1		
Nov. 10.													82				.19				683	7.0	.2	
Nov. 16.						79	27				312	0	91	24		1.5	.70	404	308	52	684	7.1	.2	
Nov. 21.													84								681	7.1	.2	
Nov. 23.						71	25				272	0	81	24		5.5		378	280	57	624	7.2		
Dec. 1.						76	30				284	0	85	30		6.3		408	313	80	682	6.9		
Dec. 8.												91				.70			427	327	80	702	7.0	.1
Dec. 12.						80	31				302	0	90	24		5.4		427	327	80	710	7.5		
Jan. 3, 1964.						93	34				345	0	109	34		8.2		499	372	90	817	7.1		
Jan. 5.													101				.33				812	7.4	.2	
Jan. 13.													104				.76				734	7.5	.2	
Jan. 30.						64	23				213	0	76	20		9.8		335	254	80	546	7.4		
Feb. 1.						66	28				239	0	85	24		12		382	280	84	603	6.9		
Feb. 7.						72	29				251	0	98	26		10		425	299	93	653	6.9		

## WABASH RIVER BASIN--Continued

3-3418.5. WABASH RIVER NEAR SULLIVAN, IND.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>	Non-carbonate hardness	Toxicity (micro-mhos at 25°C)	pH	Coliform or AS	Detergent (MB)
Mar. 9, 1964.						65	20				181	0	76	32	18	--	328	244	96	550	6.5		--
Mar. 11.....						46	12				123	0	46	15	16	--	213	165	64	326	6.4		--
Mar. 21.....						--	--				--	--	65	--	--	0.37	--	--	--	457	7.8		0.1
Mar. 25.....						--	--				--	72	--	--	--	.26	--	--	--	538	7.4		.1
Apr. 2.....						73	21				193	0	83	27	20	--	355	269	111	561	7.7		--
Apr. 6.....						--	--				--	69	--	--	--	.23	--	--	--	476	7.1		.1
Apr. 16.....						--	--				--	77	--	--	--	.26	--	--	--	530	7.4		.1
Apr. 22.....						--	--				--	35	--	--	--	.16	--	--	--	288	7.2		.0
Apr. 25.....						34	8.8				99	0	29	9.6	9.6	--	173	121	40	283	7.3		--
May 1.....						46	13				136	0	44	9.0	10	.27	220	169	57	352	7.5		.1
May 2.....						--	--				--	55	--	--	--	.25	--	--	--	337	8.3		.1
May 9.....						--	--				--	74	17	9.0	--	.28	--	--	--	559	7.7		.1
May 15.....						72	26				224	0	80	30	8.5	.22	380	287	103	604	7.6		.1
May 20.....						--	--				--	83	36	--	--	.16	--	--	--	587	7.4		.1
May 27.....						--	--				--	80	21	--	--	.33	--	--	--	568	7.6		.1
June 1.....						83	26				250	0	88	34	4.6	--	390	314	109	653	7.4		--
June 11.....						--	--				--	98	--	--	--	.63	--	--	--	572	8.5		.0
June 19.....						--	--				--	87	--	--	--	.41	--	--	--	540	8.3		.1
June 23.....						--	--				120	0	39	9.0	18	--	192	152	53	321	8.1		.0
June 24.....						41	12				--	--	--	--	--	.53	--	--	--	579	7.7		.1
July 1.....						--	--				--	68	--	--	--	--	420	274	96	615	7.9		--
July 8.....						67	26				218	0	84	35	7.3	--	255	181	62	397	7.5		--
July 13.....						51	13				144	0	44	12	19	--	--	--	--	575	7.3		.1
July 16.....						--	--				--	65	--	--	--	.49	--	--	--	534	7.6		.1
July 23.....						--	--				--	73	--	--	--	.46	--	--	--	562	7.8		.0
July 30.....						--	--				--	75	--	--	--	.50	--	--	--	545	7.8		--
Aug. 1.....						65	23				226	0	78	15	1.8	--	350	257	72	635	7.3		--
Aug. 8.....						67	25				214	0	82	49	4.5	--	406	270	94	629	7.3		.1
Aug. 9.....						--	--				--	83	--	--	--	.63	--	--	--	651	7.1		.1
Aug. 19.....						--	--				--	70	--	--	--	.59	--	--	--	647	7.3		--
Sept. 16.....						68	28				254	0	90	30	8.5	--	399	285	76	638	7.5		.1
Sept. 21.....						--	--				--	88	--	--	--	.57	--	--	--	595	7.9		--
Sept. 30.....						62	25				230	0	83	28	3.9	--	359	258	69	595	7.9		--

WABASH RIVER BASIN--Continued  
 3-3418.5. WABASH RIVER NEAR SULLIVAN, IND.--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964  
 (Once-daily measurement usually between 0800 and 1400)

CROCKFORD'S MONTHLY AVERAGE TEMPERATURES FOR THE YEARS 1850 AND 1851.																																
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		
October.....	57	60	58	61	68	67	68	68	68	65	66	59	57	66	66	68	67	68	--	67	67	--	--	69	68	70	66	62	60	60	67	
November.....	50	60	54	56	54	55	54	59	56	56	57	57	58	58	58	55	56	54	53	56	55	56	52	--	--	--	--	--	--	--	56	
December.....	45	--	40	--	45	46	47	47	51	50	44	44	44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
January.....	--	40	45	45	46	46	45	45	44	44	38	35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	37	44	--	--	
February.....	44	42	50	36	46	44	49	43	42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
March.....	--	--	--	--	--	--	41	--	46	45	44	44	47	47	48	47	47	47	47	--	--	45	46	48	47	--	--	--	43	41	--	
April.....	61	64	66	--	--	50	52	52	45	53	44	--	47	47	56	58	--	--	--	--	62	63	62	60	--	64	61	--	62	--	--	
May.....	62	60	--	64	66	68	70	64	--	64	64	64	63	65	65	--	68	72	72	72	73	75	--	76	76	77	77	77	--	--	69	
June.....	58	57	49	58	70	78	--	78	87	79	80	79	--	91	78	78	78	79	80	--	80	80	80	80	84	83	80	--	82	82	--	78
July.....	82	82	--	--	--	70	82	82	74	74	73	72	73	73	76	80	--	--	--	81	80	83	84	85	--	84	85	85	82	82	--	--
August.....	--	--	--	--	--	84	84	81	77	76	76	77	77	78	--	78	78	77	--	--	78	--	--	--	--	--	--	--	--	--	--	--
September.....	--	--	--	--	--	--	--	--	--	--	--	76	--	69	75	75	75	74	75	71	--	72	71	70	71	71	--	69	69	64	--	--

WABASH RIVER BASIN--Continued  
3-3420. WABASH RIVER AT RIVERTON, IND.

LOCATION.--Temperature recorder at gaging station on left bank at 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, October 1962 to September 1964.  
EXTREMES, 1963-64.--Water temperatures: Maximum, 87°F July 26-31, Aug. 3-7; minimum, 36°F Jan. 2-14, 17-21.  
EXTREMES, 1954-61, 1962-64.--Water temperatures: Maximum, 91°F July 20, Aug. 29, 1954; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964 (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	66	66	66	66	66	66	66	66	66	66	66	66	67	66	66	66	66	66	66	66	66	66	67	67	67	67	67	67	67	65	63	61	66	
	65	65	65	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	67	67	67	67	67	67	65	63	61	66	
	61	60	58	56	56	55	56	56	56	56	56	55	54	53	52	53	54	54	54	54	54	54	54	54	55	53	52	52	52	52	51	55	54	
November	60	58	56	56	55	55	56	56	56	56	55	54	53	52	52	53	54	54	54	54	54	54	54	54	54	53	52	52	52	52	52	51	55	
	59	58	56	56	55	55	56	56	56	56	55	54	53	52	52	53	54	54	54	54	54	54	54	54	54	53	52	52	52	52	52	51	55	
	51	49	48	47	47	46	46	46	46	45	43	43	43	43	43	43	42	42	42	41	40	40	40	40	39	39	38	38	38	38	37	42	43	
December	38	37	36	36	36	36	36	36	36	36	36	36	36	36	37	37	37	36	36	36	36	38	39	40	41	41	40	40	40	40	39	38	42	
	37	36	36	36	36	36	36	36	36	36	36	36	36	36	37	37	36	36	36	36	38	39	40	41	41	40	40	40	40	40	39	37	41	
	39	39	39	40	40	40	40	40	40	40	41	41	41	41	41	41	42	42	42	42	42	42	42	42	41	40	40	41	42	42	42	41	41	
January	42	43	44	45	46	46	47	47	47	47	47	47	46	45	46	46	46	46	46	47	47	47	47	47	47	47	47	47	47	47	47	46	46	
	42	42	43	44	45	46	47	47	47	47	47	46	45	45	45	45	46	46	47	47	47	47	47	47	47	47	47	47	47	47	47	46	46	
	47	48	48	48	49	49	50	50	50	50	52	53	53	53	53	53	54	55	57	58	59	60	60	61	61	61	62	62	62	62	62	62	54	
February	47	47	48	48	48	49	49	49	50	50	50	52	53	53	53	53	54	54	55	57	58	59	60	60	61	61	61	62	62	62	62	62	54	
	63	63	65	66	67	67	67	68	68	68	68	69	69	69	69	69	70	70	70	71	71	71	71	72	72	72	72	72	72	71	71	69	68	
	62	63	63	65	66	67	67	67	68	68	68	68	68	68	69	69	69	70	70	70	70	70	70	71	71	71	71	71	71	71	71	71	68	
March	71	71	70	70	69	69	69	70	70	71	71	72	74	75	75	75	75	75	76	77	77	78	78	79	78	78	78	78	78	78	78	78	74	74
	71	70	70	69	69	69	69	70	70	71	71	72	74	75	75	75	75	76	77	77	77	78	78	79	78	78	78	78	78	78	78	78	73	
	70	69	69	69	69	69	69	70	70	71	71	72	74	75	75	75	76	77	77	77	77	78	78	79	78	78	78	78	78	78	78	78	73	
April	78	79	79	79	78	77	77	77	77	78	78	78	78	78	79	80	81	82	83	83	85	85	85	86	87	87	87	87	87	87	87	87	81	
	78	78	78	78	77	77	77	77	77	77	77	77	77	77	78	78	79	80	81	82	83	83	85	85	86	87	87	87	87	87	87	81		
	86	86	87	87	87	87	86	86	84	83	83	81	80	79	79	79	79	79	79	79	79	79	81	81	81	80	80	82	83	84	84	83	83	
May	86	86	87	87	86	86	86	84	83	83	81	80	79	79	79	79	79	79	79	79	79	79	81	81	81	80	80	82	83	84	84	83	83	
	86	86	87	87	86	86	86	84	83	83	81	80	79	79	79	79	79	79	79	79	79	81	81	81	80	80	82	83	84	84	83	83	83	
	84	83	82	82	81	82	81	81	81	80	79	75	73	74	74	75	75	75	76	77	76	76	76	74	72	72	71	69	69	68	71	76	76	
June	82	81	81	80	80	81	80	80	77	72	72	73	74	74	74	74	74	75	75	76	76	76	74	72	72	71	69	69	68	71	76	76	76	
	82	81	81	80	80	81	80	80	77	72	72	73	74	74	74	74	74	75	75	76	76	76	74	72	72	71	69	69	68	71	76	76	76	
	82	81	81	80	80	81	80	80	77	72	72	73	74	74	74	74	74	75	75	76	76	76	74	72	72	71	69	69	68	71	76	76	76	

## WABASH RIVER BASIN--Continued

3-3485. WHITE RIVER NEAR NOBLESVILLE, IND.

LOCATION.--Temperature recorder at gaging station on downstream side of center pier of highway bridge, 1 mile west of Strawtown, 7 miles northeast of Noblesville, Hamilton County, Ind. 9.5 miles upstream from Cicero Creek.

DRAINAGE AREA.--814 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1953 to July 1957, October 1962 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 83°F July 28, 29, Aug. 2-4; minimum, freezing point Dec. 16 to Jan. 22.

EXTREMES, 1953-57, 1962-64.--Water temperatures: Maximum, 88°F July 14, 1954; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl sulfide (CS <sub>2</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific conductance (micro-mhos at 25°C)	pH or Col.	Oxygen consumed	
																			Calcium, mag.	Non-carbonate			Unfiltered	
Nov. 13, 1963	118										335	0	102	56				526	363	88	886	7.3		





## WABASH RIVER BASIN--Continued

3-3490. WHITE RIVER AT NOBLESVILLE, IND.

LOCATION.--Temperature recorder at gaging station on right bank at Logan Street Bridge in Noblesville, Hamilton County, 1.5 miles upstream from Cicero Creek, and 3.5 miles below dam at Clare.

DRAINAGE AREA.--837 square miles.

RECORDS AVAILABLE.--Water temperatures: November 1952 to September 1964.

EXTREMES, 1952-64.--Water temperatures: Maximum, 94° July 26, 26° minimum, 33°F Jan. 17-19, 22, 23, 29, 30, Feb. 10, 16, 17.

REMARKS.--Flow regulated by powerplant above station.

EXTREMES, 1952-64.--Water temperatures: Maximum, 94° 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 1963 to September 1964  
(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	63	64	64	64	64	64	66	66	65	64	65	65	64	61	62	62	62	62	63	63	64	64	64	64	65	65	65	64	60	58	55	63
	Maximum	61	61	63	62	60	62	64	64	62	63	63	63	60	58	60	60	61	61	61	62	62	62	62	62	63	63	64	60	58	54	61
November	54	53	50	48	49	50	52	51	52	52	51	48	46	46	49	51	52	52	52	55	56	55	56	50	48	47	47	46	46	44	--	48
	Maximum	53	50	48	48	48	49	50	51	51	51	48	46	45	45	44	45	48	51	50	51	52	50	48	45	46	45	45	44	40	--	50
December	42	44	45	45	45	46	45	46	45	45	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	--
	Maximum	41	41	43	45	44	42	41	41	43	39	37	38	40	41	41	42	43	41	41	41	40	39	41	44	48	46	42	41	38	36	37
January	42	43	44	44	44	49	51	51	48	51	52	53	58	58	59	60	64	63	63	58	57	59	59	59	59	59	58	57	57	57	55	55
	Maximum	38	40	43	42	42	42	49	47	45	46	50	52	56	56	57	59	62	58	55	57	58	57	58	57	58	57	56	57	56	--	52
February	57	61	64	66	68	69	70	71	70	70	68	66	65	66	67	68	70	74	77	77	75	76	77	76	77	76	75	73	67	68	67	70
	Maximum	54	57	61	64	65	67	68	68	68	66	64	62	63	65	66	68	71	72	70	69	72	73	71	72	70	66	62	62	63	66	66
March	68	69	68	72	72	69	72	79	81	81	79	78	80	82	81	77	76	80	80	77	78	82	82	81	84	86	86	87	87	--	78	78
	Maximum	63	63	62	63	67	66	67	75	76	73	73	74	76	76	73	71	72	74	75	74	73	73	73	73	73	73	73	73	73	73	73
April	86	86	86	82	81	80	75	68	71	74	75	75	74	72	71	76	81	81	85	86	89	89	90	90	90	88	90	91	91	88	85	82
	Maximum	81	80	80	78	73	74	67	66	68	71	73	74	71	70	69	71	74	77	76	80	81	82	83	83	81	82	86	85	79	79	77
May	84	87	89	89	89	87	84	84	81	77	78	76	71	72	71	73	74	76	77	77	77	77	77	77	75	76	77	78	81	81	79	79
	Maximum	78	80	81	87	84	80	78	73	73	70	68	66	66	66	69	68	72	73	75	74	72	70	71	72	72	75	76	75	74	74	74
June	81	80	79	80	79	77	77	78	79	80	80	74	69	69	69	68	66	67	70	73	74	74	74	71	64	63	62	65	65	--	68	68
	Maximum	75	73	75	73	74	71	71	73	74	73	74	68	64	63	65	65	64	66	67	68	68	67	63	62	61	61	61	61	61	61	61









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

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub> Calcium, magnesium	Total alkalinity as H <sup>+</sup>	Specific conductance (microhmhos at 25°C)	pH	Coliform	Turbidity
Apr. 3, 1964....	65	11	4.2	0.06	7.4					0	360	5.0		524	354	354	723	4.5	3	--
Apr. 15.....	421	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	265	7.3	2	25
Apr. 30.....	210	9.4	.1	.05	.00					14	101	2.0		153	106	94	463	5.1	--	--
Apr. 1-30.....		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May 1.....	238	9.3	.0	.03	1.9					12	134	2.0		206	145	135	321	7.0	2	--
May 14.....	14	--	--	--	--					--	--	--		--	--	--	--	--	--	3
May 21.....	45.2	16	13	.22	12					--	578	6.0		820	518	518	1030	4.4	2	--
May 1-31.....		--	--	--	--	--	--	--	--	--	--	--		509	--	--	865	4.6	--	--
June 1.....	13	13	7.9	.12	12					0	486	5.0		712	452	452	929	4.4	2	--
June 17.....	67	5.7	4	.04	.08					74	95	3.0		129	112	52	267	7.7	5	650
June 1-30.....	20.6	--	--	--	--					--	--	--		567	--	--	759	4.7	--	--
July 29.....	20	9.5	2.6	.02	15					0	490	4.0		789	508	508	981	4.3	5	--
July 30.....	17	7.5	.3	.00	13					0	431	3.0		648	422	422	836	4.5	5	40
July 1-31.....	5.0	--	--	--	--					--	--	--		744	--	--	920	4.3	--	--
Aug. 15.....	A	18	2.6	.02	20					0	646	5.0		982	618	618	1140	4.3	0	--
Aug. 26.....	173	--	--	--	--					--	--	--		--	--	--	--	--	--	100
Aug. 28.....	25.1	3.0	.2	--	.02					--	54	2.0		122	78	--	195	6.3	5	--
Aug. 1-31.....		--	--	--	--					--	--	--		778	--	--	971	4.8	--	--
Sept. 12.....	A	4.0	.5	.01	5.1					--	144	1.0		257	180	--	401	5.1	5	--
Sept. 29.....	659	--	--	--	--					2	56	2.0		126	81	80	202	5.4	5	130
Sept. 30.....	54.4	4.3	.2	.02	.02					--	--	--		237	--	--	390	5.8	--	--
Sept. 1-30.....		--	--	--	--					--	--	--		--	--	--	--	--	--	--

A Less than 0.05 cfs.

TRADEWATER RIVER BASIN--Continued

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	60	61	59	59	59	59	60	59	58	60	60	60	60	60	59	59	59	59	59	58	58	58	58	60	60	59	60	58	56	53	54
0800.....	50	61	62	61	62	61	62	61	61	61	61	63	62	61	63	62	61	62	61	60	61	60	61	61	61	60	61	60	61	59	57	56
1700.....	58	60	61	59	59	59	59	60	59	58	60	60	60	60	60	59	59	59	59	59	58	58	58	58	60	60	59	60	58	56	53	54
November	54	61	48	49	50	51	50	49	48	47	46	46	45	43	45	43	49	51	49	51	50	51	50	50	47	46	47	47	47	46	46	48
0800.....	54	52	51	50	51	51	51	51	51	50	49	47	45	43	49	51	49	51	49	49	51	52	56	50	49	48	49	48	48	46	43	---
1700.....	54	52	51	50	51	51	51	51	51	50	49	47	45	43	49	51	49	51	49	49	51	52	56	50	49	48	49	48	48	46	43	---
December	41	42	41	39	40	39	40	42	40	37	39	38	36	35	35	37	36	35	37	36	32	32	32	32	32	32	32	32	32	32	32	36
0800.....	41	42	41	40	40	40	41	41	40	39	40	38	38	36	35	39	37	35	39	37	36	32	32	32	32	32	32	32	32	32	32	37
1700.....	41	42	41	40	40	40	41	41	40	39	40	38	38	36	35	39	37	35	39	37	36	32	32	32	32	32	32	32	32	32	32	37
January	32	32	32	32	32	32	32	32	40	38	37	39	36	34	34	34	34	34	35	33	33	33	33	34	35	33	34	33	32	32	34	34
0800.....	32	32	32	32	32	32	32	32	40	38	37	39	36	34	34	34	34	34	35	33	33	33	33	34	35	33	34	33	32	32	34	34
1700.....	32	32	32	32	32	32	32	32	41	39	39	38	36	34	35	35	34	35	33	33	33	34	35	36	34	35	34	33	33	33	34	35
February	33	33	34	33	34	36	36	35	35	34	34	34	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	33
0800.....	33	33	34	33	34	36	36	35	35	34	34	34	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	33
1700.....	33	33	34	33	34	36	36	35	35	34	34	34	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	33
March	34	38	37	39	42	40	43	45	46	43	42	41	45	45	45	45	45	45	43	42	43	40	41	44	47	46	43	45	43	49	40	42
0800.....	34	38	39	42	40	43	44	44																								



## TRADEWATER RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964  
(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	0	1.3	6	T
2..				0	0	0	1.3	5	T
3..				0	0	0	1.1	5	T
4..				0	0	0	.9	4	T
5..				.2	7	T	.9	4	T
6..				.7	7	T	.9	3	T
7..				.9	6	T	.9	3	T
8..				.9	5	T	1.3	3	T
9..				.9	5	T	.9	3	T
10..				.7	5	T	.9	4	T
11..				.7	5	T	1.1	5	T
12..				.4	5	T	1.3	5	T
13..				.4	5	T	1.2	4	T
14..				.2	6	T	1.1	4	T
15..				.2	6	T	1.0	3	T
16..				.2	5	T	.9	3	T
17..				.2	6	T	.8	3	T
18..				.4	6	T	.8	3	T
19..				.2	5	T	.8	3	T
20..				.4	3	T	.7	3	T
21..				.4	3	T	.6	3	T
22..				.7	3	T	.6	3	T
23..				1.1	3	T	.6	3	T
24..				.9	3	T	.6	3	T
25..				.9	4	T	.8	3	T
26..				.9	5	T	1.3	3	T
27..				1.3	7	T	1.2	4	T
28..				1.5	7	T	1.1	5	T
29..				1.3	6	T	1.0	4	T
30..				1.3	6	T	1.0	4	T
31..				--	--	--	.9	4	T
Total	0		0	17.9	--	0.2	29.8	--	0.3
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..	0.9	3	T	5.4	13	0.2	8.3	12	0.3
2..	.7	3	T	4.6	14	.2	7.8	12	.2
3..	.9	3	T	4.0	15	.2	7.4	12	.2
4..	1.1	4	T	3.7	14	.1	407	191	410
5..	1.1	4	T	3.9	13	.1	1530	427	1760
6..	1.3	4	T	5.4	12	.2	1520	227	932
7..	1.3	5	T	6.3	11	.2	1610	232	1010
8..	1.5	5	T	8.7	9	.2	2560	128	885
9..	3.0	4	T	17	8	.4	7150	153	2950
10..	3.0	3	T	16	7	.3	13200	143	5100
11..	2.8	3	T	18	8	.4	12200	102	3360
12..	4.3	4	T	19	8	.4	9340	75	1890
13..	8.7	6	0.1	18	9	.4	6550	35	619
14..	8.2	7	.2	17	10	.4	4550	10	123
15..	6.6	8	.1	19	12	.6	3040	4	33
16..	5.5	8	.1	25	16	1.1	2090	5	28
17..	4.5	9	.1	33	19	1.7	1290	8	28
18..	3.9	10	.1	41	17	1.9	754	3	6.1
19..	3.8	11	.1	44	16	1.9	417	2	2.2
20..	4.5	12	.1	42	14	1.6	258	2	1.4
21..	4.2	11	.1	37	13	1.3	224	2	1.2
22..	6.1	11	.2	35	11	1.0	200	3	1.6
23..	10	11	.3	32	10	.9	179	3	1.4
24..	11	10	.3	27	9	.6	160	4	1.7
25..	10	9	.2	22	9	.5	141	5	1.9
26..	8.9	8	.2	18	10	.5	133	5	1.8
27..	8.0	8	.2	14	11	.4	128	6	2.1
28..	6.9	8	.1	12	11	.4	113	7	2.1
29..	6.3	10	.2	9.4	11	.3	102	8	2.2
30..	5.9	11	.2	--	--	--	89	9	2.2
31..	5.8	12	.2	--	--	--	77	9	1.9
Total	150.2	--	3.3	557.4	--	18.4	70035.5	--	19158.5

S Computed by subdividing day.

T Less than 0.05 ton.

## TRADEWATER RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..	71	10	1.9	238	9	5.8	13	7	0.2
2..	68	10	1.8	151	7	2.8	16	7	.3
3..	65	9	1.6	112	5	1.5	16	7	.3
4..	63	8	1.4	90	3	.7	17	6	.3
5..	68	8	1.5	74	3	.6	19	5	.2
6..	330	29	S 29	60	4	.6	20	4	.2
7..	541	43	63	50	4	.5	20	3	.2
8..	446	22	26	42	4	.4	20	2	.1
9..	280	12	9.1	37	4	.4	20	3	.2
10..	160	12	5.8	32	4	.3	23	3	.2
11..	138	12	4.5	29	5	.4	26	4	.3
12..	116	12	3.8	48	5	.6	29	4	.3
13..	154	50	A 20	73	6	1.2	30	5	.4
14..	255	--	35	69	7	1.3	32	5	.4
15..	348	--	40	55	7	1.0	36	5	.5
16..	244	--	14	42	6	.7	87	3	.7
17..	171	--	8	32	5	.4	67	4	.7
18..	133	--	5	24	4	.2	43	5	.6
19..	108	10	2.9	20	5	.3	22	6	.4
20..	93	9	2.2	17	5	.2	12	5	.2
21..	79	7	1.5	14	5	.2	7.4	5	.1
22..	78	7	1.5	11	5	.1	5.4	5	.1
23..	91	--	2	9.9	5	.1	3.6	5	T
24..	163	--	6	8.6	5	.1	3.0	5	T
25..	235	--	10	8.2	5	.1	3.6	5	T
26..	396	17	18	7.8	5	.1	4.1	4	T
27..	277	9	6.7	5.8	4	.1	4.6	4	T
28..	252	9	6.1	6.6	4	.1	5.8	3	T
29..	450	22	27	9.2	5	.1	6.2	3	.1
30..	421	17	19	11	6	.2	6.2	3	.1
31..	--	--	--	13	7	.2	--	--	--
Total	6314	--	374.3	1400.1	--	21.3	617.9	--	7.4
	JULY			AUGUST			SEPTEMBER		
1..	6.2	3	0.1	11	3	0.1	5.8	2	T
2..	6.2	3	.1	9.2	3	.1	3.3	2	T
3..	6.2	4	.1	8.2	4	.1	1.5	2	T
4..	5.8	3	T	7.4	4	.1	0	0	0
5..	4.6	2	T	5.8	4	.1	0	0	0
6..	4.3	2	T	4.6	4	T	.4	3	T
7..	3.8	2	T	3.8	4	T	0	0	0
8..	2.8	2	T	3.3	5	T	0	0	0
9..	1.8	2	T	2.5	6	T	0	0	0
10..	1.1	3	T	1.5	7	T	0	0	0
11..	.9	3	T	1.1	7	T	0	0	0
12..	1.3	3	T	.2	7	T	0	0	0
13..	1.3	3	T	0	0	0	0	0	0
14..	1.1	4	T	0	0	0	0	0	0
15..	.9	5	T	0	0	0	0	0	0
16..	.4	3	T	0	0	0	0	0	0
17..	.4	3	T	0	0	0	0	0	0
18..	.4	4	T	0	0	0	0	0	0
19..	2.3	4	T	0	0	0	0	0	0
20..	2.8	4	T	0	0	0	0	0	0
21..	2.5	4	T	0	0	0	0	0	0
22..	3.0	4	T	3.6	23	.2	.9	5	T
23..	4.3	3	T	39	--	2	3.6	11	.1
24..	4.3	2	T	16	3	.1	.9	11	T
25..	4.3	2	T	18	--	9	0	0	0
26..	4.3	2	T	101	60	16	0	0	0
27..	8.6	2	T	276	42	31	30	13	S 1.3
28..	18	2	.1	172	21	9.8	319	90	78
29..	20	3	.2	59	10	1.6	608	106	174
30..	17	3	.1	23	6	.4	659	61	108
31..	14	3	.1	11	3	.1	--	--	--
Total	154.9	--	1.2	777.2	--	70.9	1632.4	--	361.5

Total discharge for year (cfs-days)..... 81687.3  
 Total load for year (tons)..... 20017.3

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

TRADEWATER RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1963 to September 1964  
(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)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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. 5, 1964.....	0700			1500	533		67	74	83	92	99	99	100				SEWC	
Mar. 7, 1964.....	0715			1500	265		80	85	91	95	98	99	100				SEWC	

## 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 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 85°F June 22, 23, July 27, 28; minimum, freezing point on many days during December and January.

EXTREMES, 1949-54.--Water temperatures: Maximum, 91°F June 28, 1952; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964  
(Twice-daily measurements at approximately 0800 and 1700)

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																																	
0800.....	60	61	61	61	63	65	66	65	--	61	61	60	61	60	60	60	58	57	55	55	58	52	54	59	56	54	60	62	60	55	54	59	
1700.....	62	65	65	65	66	63	63	65	62	65	65	61	64	63	63	62	60	60	59	60	61	60	61	60	65	60	60	61	63	59	58	55	62
November																																	
0800.....	55	50	49	48	48	50	50	50	50	49	49	48	48	45	42	42	48	45	48	49	50	50	51	50	50	50	48	48	49	42	--	48	
1700.....	52	51	49	48	48	50	50	51	50	50	50	48	45	45	42	42	45	48	50	50	51	52	52	50	50	49	48	50	48	42	--	49	
December																																	
0800.....	40	40	40	38	39	38	35	40	38	36	36	39	39	36	34	35	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	35	
1700.....	40	40	40	39	39	35	39	39	38	39	38	39	37	38	34	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	35	
January																																	
0800.....	32	32	32	32	32	32	32	32	32	32	38	38	36	35	35	32	32	32	32	32	32	34	39	38	40	40	40	38	35	35	35	35	
1700.....	32	32	32	32	32	32	32	32	32	32	38	38	36	35	35	32	32	32	32	32	32	40	40	40	42	41	40	38	36	36	36	36	
February																																	
0800.....	36	36	35	35	38	38	39	39	38	36	35	38	37	38	40	40	40	40	40	40	39	39	35	36	39	38	39	39	39	--	--	38	
1700.....	38	38	38	38	40	38	39	39	39	38	36	36	38	39	40	40	40	40	40	40	39	39	36	40	39	39	39	39	39	--	--	39	
March																																	
0800.....	39	40	41	41	47	44	45	48	50	50	47	45	46	50	48	46	48	45	46	45	44	42	46	50	50	48	48	48	--	--	46	46	
1700.....	42	45	50	50	52	55	55	50	49	50	52	54	52	55	55	56	60	61	61	63	65	62	61	62	62	60	62	61	62	--	56	56	
April																																	
0800.....	42	49	52	50	50	55	59	54	50	50	53	52	52	54	58	59	60	61	64	63	68	66	63	65	62	62	65	65	--	58	58	58	
1700.....	42	49	52	50	50	55	59	54	50	50	53	52	52	54	58	59	60	61	64	63	68	66	63	65	62	62	65	65	--	58	58	58	
May																																	
0800.....	60	62	63	62	65	68	69	69	71	70	70	70	70	70	71	66	69	69	71	72	74	75	74	75	74	75	75	76	70	66	66	70	
1700.....	66	65	66	69	69	70	71	71	71	70	70	70	70	70	68	68	70	73	75	76	77	76	77	78	79	79	75	73	68	69	72	72	
June																																	
0800.....	66	66	65	63	65	66	70	71	72	76	78	78	78	78	79	75	79	79	78	79	80	81	82	83	79	78	79	80	--	75	--	75	
1700.....	66	65	65	68	68	70	70	75	77	78	79	80	80	78	79	79	79	79	82	82	81	85	85	83	80	81	80	81	81	--	77	--	77
July																																	
0800.....	80	80	79	80	79	79	79	79	79	79	80	80	78	78	76	78	77	80	79	76	79	80	81	82	81	81	82	83	80	78	79	79	
1700.....	80	80	82	82	80	80	80	80	81	80	81	80	79	79	79	79	79	79	79	79	80	81	82	83	84	83	85	85	82	81	80	81	
August																																	
0800.....	79	80	81	82	79	73	73	75	74	75	76	78	74	71	68	68	69	69	70	72	75	76	77	78	79	79	80	80	78	78	76	76	
1700.....	80	83	83	83	70	75	76	75	77	75	78	77	75	72	68	--	69	70	73	75	77	78	77	77	77	77	77	79	79	--	79	80	
September																																	
0800.....	76	75	75	75	74	74	74	74	74	69	68	65	65	67	68	69	68	69	68	70	70	68	66	64	65	67	68	66	--	70	--	73	
1700.....	79	77	75	77	78	79	77	77	77	78	78	75	72	69	69	68	69	68	69	--	71	71	72	68	69	66	67	68	69	--	70	--	

## CUMBERLAND RIVER BASIN--Continued

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

LOCATION--At gaging station, 2,100 feet upstream from confluence with West Fork Cane Branch, 2.5 northeast of Parkers Lake, and 2.6 miles east of Green-  
 DRAINAGE AREA--0.87 square miles.

RECORDS AVAILABLE--Chemical analyses: January 1956 to September 1964.

Water temperatures: January to September 1956, unpublished; October 1956 to September 1962.

Sediment records: January 1956 to September 1962, October 1963 to September 1964.

EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 3,210 ppm Aug. 8; minimum daily, 1 ppm on many days during October, November, January, and September.

Sediment loads: Maximum daily, 63.8 tons Sept. 29; minimum daily, less than 0.005 tons on many days during October to January, June to September.

EXTREMES, 1956-62, 1963-64.--Sediment concentrations: Maximum daily, 18,000 ppm Oct. 28, 1958; minimum daily, 1 ppm on many days during 1956-57, 1963-64.

Sediment loads: Maximum daily, 750 tons Feb. 27, 1962; minimum daily, less than 0.005 tons on many days most years.

REMARKS: Acidity values reported are potential free and determined to pH 7.0. Flow affected by ice Dec. 15, 16. The sediment station operation was discontinued Jan. 10 and started again on June 29.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Alu- mi- num (Al)	Iron (Fe)	Man- ga- nese (Mn)	Cal- cium (Ca)	Mag- ne- sium (Mg)	Sodium (Na)	Po- tas- sium (K)	Lith- ium (Li)	Bi- car- bon- ate (HCO <sub>3</sub> )	Car- bon- ate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluo- ride (F)	Ni- trate (NO <sub>3</sub> )	Phos- phate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific conduct- ance pH or Col- or	Oxygen consumed	
																			Cal- cium, mag- nesium	Non- car- bon- ate			
Oct. 1, 1963.	0.09	--	--	--	--	--	--	--	--	--	--	--	242	--	--	--	--	--	--	--	700	3.2	--
Oct. 8.....	.09	--	--	--	--	--	--	--	--	--	--	--	184	--	--	--	--	--	--	--	544	3.4	--
Oct. 15.....	.05	--	--	--	--	--	--	--	--	--	--	--	172	--	--	--	--	--	--	--	486	3.6	--
Oct. 22.....	.08	--	--	--	--	--	--	--	--	--	--	--	158	--	--	--	--	--	--	--	453	3.6	--
Oct. 29.....	.09	--	--	--	--	--	--	--	--	--	--	--	152	--	--	--	--	--	--	--	445	3.7	--
Nov. 5.....	.11	--	--	--	--	--	--	--	--	--	--	--	168	--	--	--	--	--	--	--	446	3.6	--
Nov. 12.....	.08	--	--	--	--	--	--	--	--	--	--	--	176	--	--	--	--	--	--	--	448	3.8	--
Nov. 19.....	.14	--	--	--	--	--	--	--	--	--	--	--	166	--	--	--	--	--	--	--	485	3.6	--
Nov. 26.....	.08	--	--	--	--	--	--	--	--	--	--	--	199	--	--	--	--	--	--	--	565	3.5	--
Dec. 10.....	.09	--	--	--	--	--	--	--	--	--	--	--	217	--	--	--	--	--	--	--	597	3.4	--
Dec. 17.....	.03	--	--	--	--	--	--	--	--	--	--	--	168	--	--	--	--	--	--	--	455	3.7	--
Dec. 26.....	.07	--	--	--	--	--	--	--	--	--	--	--	169	--	--	--	--	--	--	--	445	3.9	--
Jan. 9, 1964.	4.2	6.3	6.5	5.6	4.9	17	8.3	0.7	1.4	--	0	140	0.5	0.0	0.1	--	191	76	1.6	381	3.6	3	
Jan. 21.....	.87	--	--	--	--	--	--	--	--	--	--	--	104	--	--	--	--	--	--	322	3.6	--	
Jan. 28.....	.41	--	--	--	--	--	--	--	--	--	--	--	113	--	--	--	--	--	--	330	3.8	--	
Feb. 4.....	.24	--	--	--	--	--	--	--	--	--	--	--	169	--	--	--	--	--	--	481	3.2	--	
May 25.....	.08	18	5.1	4.2	18	30	24	2.0	2.7	--	0	251	3.0	.4	.4	--	351	174	2.4	680	3.2	2	
June 23.....	.10	--	4.9	3.6	8.9	--	--	--	--	--	0	198	--	--	--	--	293	--	--	1.2	621	3.2	--
June 24.....	.08	--	5.2	4.0	12	--	--	--	--	--	0	225	--	--	--	--	333	--	--	1.4	669	3.2	--
June 30.....	.08	--	--	--	--	--	--	--	--	--	0	--	--	--	--	--	--	--	--	1.1	644	3.2	--
July 7.....	.06	--	5.4	12	11	--	--	--	--	--	0	228	--	--	--	--	353	--	--	1.4	673	3.2	--
July 14.....	.06	--	6.8	6.3	12	--	--	--	--	--	0	248	--	--	--	--	--	--	--	1.6	736	3.2	--
July 21.....	.04	--	4.3	--	--	--	--	--	--	--	0	205	--	--	--	--	316	--	--	1.3	633	3.2	--
July 28.....	.04	--	3.4	3.8	9.5	--	--	--	--	--	0	201	--	--	--	--	322	--	--	1.2	610	3.2	--

Aug. 3, 1964.	.03	--	--	3.5	5.4	--	--	1.5	--	0	200	--	--	288	144	144	1.2	624	3.2	--
Aug. 4.....	.06	--	--	5.8	13	--	--	1.5	--	0	242	--	--	358	178	178	1.4	689	3.2	--
Aug. 11.....	.06	--	--	4.2	--	--	--	5.8	--	0	203	--	--	318	141	141	1.6	641	3.2	--
Aug. 18.....	.06	--	--	--	--	--	--	1.6	--	0	236	--	--	366	158	158	1.8	698	3.2	--
Aug. 25.....	.06	--	--	--	--	--	--	2.6	--	0	201	--	--	303	134	134	1.4	583	3.2	--
Sept. 1.....	.04	--	--	--	--	--	--	3.2	--	0	176	--	--	279	126	126	1.1	521	3.4	--
Sept. 8.....	.06	--	--	3.1	9.4	--	--	1.2	--	0	156	--	--	218	126	126	1.1	489	3.4	--
Sept. 15.....	.04	--	--	--	--	--	--	1.2	--	0	160	--	--	230	120	120	1.0	492	3.4	--
Sept. 22.....	.03	--	--	--	--	--	--	1.7	--	0	--	--	--	--	--	--	--	462	3.4	--
Sept. 29.....	4.50	--	--	--	--	--	--	1.0	--	0	228	--	--	343	108	108	3.0	619	3.2	--

## CUMBERLAND RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964

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..	0.09	1	T	0.17	2	T	0.11	4	T
2..	.09	1	T	.14	1	T	.11	3	T
3..	.09	1	T	.12	1	T	.11	3	T
4..	.08	1	T	.11	2	T	.09	4	T
5..	.08	1	T	.10	2	T	.09	4	T
6..	.08	1	T	.14	3	T	.08	4	T
7..	.08	1	T	.09	1	T	.08	2	T
8..	.08	1	T	.09	1	T	.18	8	T
9..	.08	1	T	.09	1	T	.11	4	T
10..	.07	1	T	.09	1	T	.09	3	T
11..	.07	1	T	.08	1	T	.41	--	E 0.4
12..	.07	1	T	.08	1	T	.40	--	E .2
13..	.06	1	T	.08	2	T	.15	4	T
14..	.06	1	T	.10	2	T	.11	3	T
15..	.06	1	T	.11	1	T	.06	2	T
16..	.06	1	T	.11	1	T	.03	2	T
17..	.06	1	T	.11	1	T	.03	2	T
18..	.06	1	T	.13	1	T	.02	2	T
19..	.06	1	T	.14	3	T	.02	2	T
20..	.07	1	T	.12	2	T	.02	2	T
21..	.08	1	T	.11	3	T	.02	2	T
22..	.08	1	T	.11	8	T	.02	2	T
23..	.09	1	T	.36	86	S	.02	2	T
24..	.09	1	T	.10	6	T	.03	2	T
25..	.09	1	T	.09	2	T	.05	2	T
26..	.09	1	T	.09	1	T	.07	2	T
27..	.09	1	T	.09	1	T	.10	2	T
28..	.09	1	T	.09	1	T	.10	2	T
29..	.09	1	T	.31	37	.03	.10	3	T
30..	.09	1	T	.12	5	T	.10	4	T
31..	.09	1	T	--	--	--	.10	5	T
Total	2.42	--	0.01	3.67	--	0.33	3.01	--	0.62
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..	0.10	4	T						
2..	.10	3	T						
3..	.12	2	T						
4..	.15	2	T						
5..	.13	1	T						
6..	.80	3	B						
7..	2.2	35	A						
8..	.81	7	B						
9..	3.3	--	E						
10..	--	--	--						
11..	--	--	--						
12..	--	--	--						
13..	--	--	--						
14..	--	--	--						
15..	--	--	--						
16..	--	--	--						
17..	--	--	--						
18..	--	--	--						
19..	--	--	--						
20..	--	--	--						
21..	--	--	--						
22..	--	--	--						
23..	--	--	--						
24..	--	--	--						
25..	--	--	--						
26..	--	--	--						
27..	--	--	--						
28..	--	--	--						
29..	--	--	--						
30..	--	--	--						
31..	--	--	--						
Total	7.71	--	2.03						

E Estimated.

S Computed by subdividing day.

T Less than 0.005 ton.

A Computed from partly estimated concentration graph.

B Computed from estimated concentration graph.

## CUMBERLAND RIVER BASIN--Continued

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

Suspended sediment, water year October 1963 to September 1964--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..									
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..							0.08		
30..							--	3	T
31..							--	--	--
Total							0.08		0.001
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..	0.08	3	T	0.04	8	T	0.04	1	T
2..	.07	3	T	.03	3	T	.04	1	T
3..	.06	3	T	.03	4	T	.04	1	T
4..	.19	--	E	.06	--	E	0.01	2	T
5..	.06	5	T	.04	33	T	.04	2	T
6..	.06	5	T	.03	15	T	.04	2	T
7..	.12	271	S	.03	10	T	.04	2	T
8..	.19	--	E	.72	3210	S	.04	2	T
9..	.06	35	B	.07	44	T	.04	2	T
10..	.06	23	T	.06	26	T	.04	3	T
11..	.06	22	T	.12	27	E	.06	4	T
12..	.20	178	S	.06	12	T	.06	3	T
13..	.08	32	T	.04	7	T	.06	4	T
14..	.06	3	T	.04	7	T	.06	7	T
15..	.04	3	T	.04	7	T	.04	10	T
16..	.04	3	T	.11	31	T	.04	8	T
17..	.04	3	T	.06	12	T	.06	6	T
18..	.04	3	T	.06	6	T	.11	26	0.01
19..	.04	3	T	.04	5	T	.16	197	S
20..	.04	3	T	.04	6	T	.04	16	T
21..	.04	4	T	.04	5	T	.04	9	T
22..	.04	4	T	.53	1800	S	.04	17	T
23..	.04	3	T	.14	--	E	.04	12	T
24..	.03	4	T	.08	19	T	.04	10	T
25..	.03	4	T	.06	16	T	.04	9	T
26..	.04	5	T	.08	12	T	.04	7	T
27..	.03	5	T	.06	9	T	.04	6	T
28..	.04	5	T	.06	7	T	1.12	2600	S
29..	.37	176	S	.06	5	T	3.5	2370	S
30..	.08	22	T	.06	3	T	.21	17	.01
31..	.04	10	T	.06	2	T	--	--	--
Total	2.37	--	11.60	2.95	--	76.66	6.20	--	100.51

Total discharge for period (cfs-days)..... 28.41  
 Total load for period (tons)..... 191.661

E Estimated.

B Computed from estimated concentration graph.

S Computed by subdividing day.

T Less than 0.005 ton.



## CUMBERLAND RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1963 to September 1964  
 (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)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment con- cen- tration (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
July 7, 1964.....	2330			2.6	4000		53	62	78	91	98	99	100					SBWC
July 12.....	1630			1.64	1910		61	73	87	96	98	99	100					SBWC
July 29.....	1305			.99	9830		55	66	82	93	98	99	100					SBWC



## CUMBERLAND RIVER BASIN--Continued

3-4385. CUMBERLAND RIVER AT SMITHLAND, KY.

LOCATION.--At gaging station at bridge on U.S. Highway 80 at Smithland, Livingston County, 1 mile downstream from McCormick Creek, and 2.8 miles upstream from mouth.  
DRAINAGE AREA.--17,913 square miles.  
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1950, October 1956 to December 1961.

Water temperatures: October 1949 to September 1964.  
EXTREMES, 1963-64.--Water temperatures: Maximum, 85°F Aug. 4; minimum, 33°F on several days during December and January.

EXTREMES, 1949-64.--Water temperatures: Maximum, 90°F Aug. 3, 1950; minimum, freezing point Jan. 28, Feb. 3, 1963.

REMARKS.--Construction of migration dams on Cumberland River, and by Fall Falls Lake, Lake Cumberland, Dale Hollow Reservoir, Center Hill Reservoir, Old Hickory Lake and Lake Barkley.

Temperature (°F) of water, water year October 1963 to September 1964  
(Twice-daily measurements at approximately 0630 and 1900)

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																																	
0630.....	69	69	68	69	68	69	70	69	69	69	69	68	69	69	69	69	68	67	66	67	68	67	67	68	68	68	68	67	66	64	63	68	
1900.....	69	69	68	69	69	70	70	69	69	69	69	69	69	69	69	69	68	67	68	68	67	68	68	68	68	68	67	66	64	64	68	68	
November																																	
0630.....	63	62	60	60	59	59	59	58	58	57	57	55	54	55	55	55	55	55	54	55	56	56	56	55	55	56	55	54	53	52	--	57	
1900.....	63	61	60	60	59	59	59	59	59	58	57	56	55	54	55	55	55	55	55	55	56	57	56	55	55	56	55	54	53	51	--	57	
December																																	
0630.....	50	51	50	48	48	48	47	46	45	44	45	44	41	39	39	38	36	34	34	34	34	33	33	33	34	35	35	34	33	33	40	40	
1900.....	51	51	49	48	49	49	48	47	46	44	45	44	42	40	39	39	37	36	34	34	34	34	33	34	35	34	36	35	34	33	34	40	
January																																	
0630.....	33	33	36	40	38	37	36	37	36	37	36	37	36	36	36	37	36	37	40	39	40	41	42	43	41	42	41	39	41	43	38	43	
1900.....	34	34	39	39	39	38	37	38	37	37	37	37	37	38	38	38	38	40	40	41	42	43	43	43	41	43	42	40	42	43	39	43	
February																																	
0630.....	42	42	41	42	42	43	42	42	41	42	43	42	43	42	44	43	42	43	44	42	41	43	42	43	43	42	43	42	42	43	42	42	
1900.....	43	43	42	43	43	43	42	41	42	42	42	43	44	44	43	43	43	43	43	43	43	42	42	43	43	44	43	43	43	43	--	43	
March																																	
0630.....	43	44	43	43	41	43	46	50	51	50	49	49	51	52	52	52	52	52	52	52	51	50	50	51	52	51	50	50	49	49	49	49	
1900.....	43	44	44	42	42	45	48	51	51	50	50	51	52	52	52	53	53	51	53	50	51	51	50	51	52	51	50	50	49	50	50	50	
April																																	
0630.....	50	50	51	50	53	54	53	53	54	56	57	56	57	56	57	58	59	59	60	61	61	62	62	63	64	64	64	63	62	--	57	57	
1900.....	50	50	51	51	53	54	54	54	54	56	57	57	57	57	59	59	60	60	62	62	63	64	64	64	64	64	64	63	63	62	--	58	
May																																	
0630.....	62	62	61	61	62	63	64	64	65	65	64	65	66	65	66	67	68	69	68	69	70	71	71	72	71	72	71	70	69	67	67	67	
1900.....	62	62	61	62	63	64	64	65	64	65	66	65	66	67	68	69	68	69	70	71	71	72	71	72	71	72	71	70	69	67	67	67	
June																																	
0630.....	69	68	67	67	69	69	71	72	73	75	77	76	79	79	79	79	80	79	80	81	82	82	82	83	83	83	81	81	82	81	--	77	
1900.....	70	68	68	68	69	70	72	73	75	76	78	77	78	79	80	81	79	80	81	82	83	83	83	84	82	82	82	81	--	78	78	78	
July																																	
0630.....	80	82	83	83	81	81	81	81	81	81	82	80	80	80	81	81	81	80	79	80	81	81	81	81	81	82	83	82	83	82	81	82	
1900.....	82	84	84	83	82	82	82	82	82	83	82	80	81	81	82	82	80	81	82	80	81	82	82	82	83	84	84	83	84	84	84	82	82
August																																	
0630.....	83	82	83	83	83	83	83	83	82	82	82	81	79	80	79	78	77	78	78	78	79	--	77	76	76	76	75	75	77	79	79	79	
1900.....	84	83	84	85	84	84	83	83	82	82	80	79	78	78	78	78	78	78	79	79	78	77	76	75	76	75	76	76	79	79	80	80	
September																																	
0630.....	79	78	79	79	79	80	--	80	80	80	80	79	76	75	74	75	74	75	75	75	75	75	75	75	75	74	74	74	71	69	70	76	
1900.....	80	79	80	80	80	81	81	81	81	81	80	78	76	75	74	75	74	75	75	75	76	76	75	76	75	74	74	73	70	69	71	--	

## 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, and 1 mile upstream from East Fork. DRAINAGE AREA --67.9 square miles.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Residue at 180°C	Calculated	Calcium	Non-magnesium			
Oct. 2, 1963...	84	8.0	0.02	1.4	0.9	1.0	0.3	10	1.4	0.7	0.1	0.2	0.30	--	19	8	0	19	6.5	10
Nov. 5, 1963...	61	9.0	0.01	1.7	.2	1.3	.5	9	1.8	1.9	0	.2	.00	21	20	5	0	19	6.3	5
Dec. 3, 1963...	128	7.3	.05	1.3	.3	1.7	.3	8	1.8	1.0	.1	.0	.00	16	18	4	0	18	6.3	8
Jan. 3, 1964...	232	7.4	.04	1.6	.2	1.9	.2	6	2.2	1.3	.0	.1	.00	17	19	6	0	20	6.4	8
Feb. 3, 1964...	212	7.3	.02	1.6	.1	1.9	.3	8	1.8	1.9	.0	.0	.00	18	16	4	0	13	6.4	4
Mar. 2, 1964...	212	7.3	.02	1.1	.2	1.2	.4	8	1.8	.3	.2	.0	.00	18	16	4	0	14	6.8	12
Apr. 1, 1964...	308	6.7	.00	.8	.4	.9	.3	8	.2	6	0	.1	.00	15	14	4	0	19	6.4	5
May 5, 1964...	446	6.2	.01	.8	.3	1.3	.3	7	.4	1.0	.0	.0	.00	13	13	3	0	13	6.3	5
June 1, 1964...	224	7.3	.01	1.0	.3	1.1	.3	8	1.2	1.4	.0	.1	.10	16	17	4	0	16	6.0	5
June 30, 1964...	108	8.7	.02	.9	.3	1.5	.5	8	1.2	1.0	.1	.2	.00	16	18	3	0	16	6.5	8
Aug. 3, 1964...	137	7.6	.03	1.4	.3	1.3	.6	10	1.0	1.4	.0	.0	.00	16	19	5	0	25	6.8	15
Sept. 1, 1964...	285	6.9	.00	1.8	.6	1.2	.6	9	1.8	1.4	.0	.6	.00	28	19	6	0	24	6.4	12

## TENNESSEE RIVER BASIN--Continued

3-4430. FRENCH BROAD RIVER AT BLANTYRE, N. C.

LOCATION --At gaging station at bridge on Secondary Road 1503, 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 1963, October 1957 to September 1964.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Residue at 180°C	Calculation	Calcium	Non-carbonate			
Oct. 3, 1963...	404	9.2	0.02	12	0.2	30	1.8	43	45	8.9	0.1	0.2	0.00	138	128	30	0	215	6.8	75
Nov. 1.....	241	9.7	.04	11	.7	43	1.8	45	76	9.4	.1	.2	.00	177	174	32	0	275	6.5	40
Dec. 6.....	589	8.0	.01	8.6	.6	25	1.1	36	38	7.2	.0	.7	.00	111	107	24	0	160	6.4	35
Jan. 3, 1964...	11	7.8	.04	4.8	.3	19	1.9	24	32	3.7	.0	.0	.00	87	84	16	0	135	7.2	38
Feb. 4.....	856	6.9	.03	2.9	.4	9.6	.8	13	14	3.8	.1	.4	.00	56	45	8	0	77	6.9	15
Mar. 9.....	1390	6.9	.03	2.9	.4	9.6	.8	13	14	3.8	.1	.4	.00	56	45	8	0	77	6.9	15
Apr. 2.....	1230	7.6	.02	2.6	.5	9.6	.8	11	19	3.0	.1	.1	.00	54	48	8	0	72	6.2	20
May 5.....	1940	7.1	.02	1.9	.7	6.5	.6	12	9.2	1.0	.0	.2	.00	36	33	8	0	60	6.3	10
June 1.....	796	8.6	.03	3.8	.4	13	.9	16	26	2.0	.0	.4	.00	67	63	11	0	95	6.2	20
July 1.....	440	9.3	.09	7.1	.3	23	1.4	26	44	4.1	.0	.7	.00	109	103	19	0	163	6.4	7
Aug. 6.....	593	8.7	.08	6.3	.5	18	1.1	26	29	5.0	.1	2.9	.00	89	85	18	0	140	7.2	50
Sept. 2.....	1460	7.5	.01	3.0	.6	8.7	.8	13	17	2.2	.0	.7	.00	55	47	10	0	72	6.2	18

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, and 6.7 miles south of Asheville, Buncombe County.  
DRAINAGE AREA --676 square miles.  
RECORDS AVAILABLE --Chemical analyses: October 1957 to September 1964.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25° C)	pH	Color
														Residue at 180° C	Calculated	Calcium-magnesium	Non-carbonate			
Oct. 15, 1963..	473	10	0.05	7.4	0.6	25	1.8	36	37	7.1	0.0	0.3	0.10	110	107	21	0	170	7.2	55
Nov. 18.....	414	9.6	.15	5.9	.3	16	1.2	26	26	4.5	.0	.0	.00	82	77	16	0	120	7.0	33
Dec. 12.....	1240	8.5	.02	2.2	.4	2.8	.5	12	5.0	1.6	.0	.1	.00	26	27	8	0	29	6.3	10
Jan. 17, 1964..	1374	7.6	.01	1.9	.2	1.3	.5	10	1.2	1.9	.0	.0	.00	20	20	6	0	19	6.2	4
Feb. 17.....	1910	7.2	.01	2.3	.1	2.5	.4	8	4.4	2.1	.0	.3	.00	20	23	6	0	27	6.7	5
Mar. 23.....	2190	7.3	.02	1.4	.6	1.9	.4	9	2.4	1.6	.0	.0	.00	21	20	6	0	22	6.4	10
Apr. 13.....	2980	7.4	.01	1.4	.3	1.4	.5	9	1.0	.5	.1	.0	.00	18	17	4	0	19	6.4	15
May 14.....	1970	8.0	.02	1.2	.5	1.5	.6	10	1.2	1.4	.0	.0	.10	19	20	5	0	20	6.6	15
June 9.....	1150	8.7	.02	1.9	.7	4.4	.6	13	5.8	1.6	.0	.1	.00	29	30	8	0	38	6.4	5
July 7.....	706	9.0	.05	2.8	.7	8.8	.8	20	13	1.7	.0	.7	.00	50	47	10	0	71	6.4	15
Aug. 11.....	1410	9.0	.12	3.7	.7	12	1.3	22	15	3.3	.1	.4	.10	61	57	12	0	100	7.1	45
Sept. 15.....	987	8.9	.05	3.3	.6	9.9	.9	22	12	2.4	.0	.8	.00	48	50	10	0	73	6.6	27

## 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, and 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 1964.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or
														Residue at 180°C	Calculation	Calcium	Non-carbonate		
Oct. 15, 1963...	574	12	0.03	8.0	1.3	45	2.3	44	65	13	0.1	3.5	0.70	177	173	25	0	258	6.3
Nov. 18, 1963...	514	9.1	0.07	7.7	2.1	33	17	26	66	8.3	0.1	2.2	0.50	148	142	28	6	235	6.0
Dec. 12, 1963...	1320	9.7	0.04	6.1	1.4	22	1.5	30	31	8.0	0.1	2.5	0.40	99	98	20	0	155	6.3
Jan. 17, 1964...	1500	9.3	0.02	4.1	1.1	19	1.1	31	19	7.9	0.1	2.6	0.40	77	80	14	0	120	7.1
Feb. 24, 1964...	1800	8.9	0.03	3.8	0.6	17	0.8	24	17	8.6	0.0	0.6	0.20	66	70	12	0	110	6.2
Mar. 23, 1964...	2520	8.0	0.02	3.2	0.8	8.0	1.0	14	12	3.9	0.0	1.4	0.30	49	46	11	0	69	6.1
Apr. 13, 1964...	3530	7.8	0.02	2.6	0.8	5.0	0.8	11	10	3.1	0.0	0.4	0.00	38	36	10	1	52	6.1
May 14, 1964...	2450	8.3	0.01	2.9	0.7	12	1.0	26	12	3.0	0.0	0.1	0.10	56	53	10	0	81	6.8
June 13, 1964...	1900	8.1	0.02	2.8	0.8	13	1.0	24	24	3.6	0.0	0.1	0.10	86	86	12	0	120	6.1
July 13, 1964...	1951	8.9	0.03	4.6	1.3	16	1.5	16	31	3.4	0.0	1.7	0.10	77	77	17	4	120	6.1
Aug. 19, 1964...	1760	9.1	0.03	3.6	1.3	13	1.3	17	24	3.5	0.1	1.1	0.10	65	64	14	0	110	6.8
Sept. 15, 1964...	1160	9.9	0.09	5.2	1.0	21	1.9	30	28	6.0	0.1	3.5	0.50	107	92	17	0	142	6.5





TENNESSEE RIVER BASIN--Continued  
3-4535. FRENCH BROAD RIVER AT MARSHALL, N. C.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>	Specific conductance (micro-mhos at 25°C)	pH	Col- or
														Residue at 180°C	Calculation				
June 1-30, 1964	1523																		
July 1-18.....	1159	11	0.17	4.6	1.2	17	1.6	20	32	4.4	0.2	1.9	0.40	90	84	16	120	7.0	30
July 19-31.....	2662	11	.06	5.0	1.8	21	2.0	22	38	6.5	.11	3.1	.30	98	100	20	160	7.1	30
Aug. 1-14.....	1559	9.5	.02	4.5	1.5	12	1.8	18	21	3.4	.11	.7	.00	76	64	17	2	105	6.9
Aug. 15-17.....	3050	10	.11	4.8	1.7	17	1.9	19	32	4.5	.0	2.9	.20	91	85	19	4	130	6.7
Aug. 18-21.....	2270	12	.03	4.9	1.6	19	2.0	20	17	3.9	.2	3.9	--	--	--	19	2	92	6.1
Aug. 22-24.....	1930		--	4.5	2.9	13	2.3	17	31	6.0	.1	2.2	.50	--	90	18	0	130	6.6
Aug. 25-28.....	1580	12	.02	5.2	1.6	19	1.8	24	33	6.2	--	--	--	--	--	24	10	88	8.3
Aug. 29-31.....	6367		--	--	--	7.9	2.1	15	21	3.5	--	--	--	--	--	93	20	140	6.4
Sept. 1-6.....	3790	11	.02	4.9	1.0	10	1.5	19	16	3.2	--	--	--	66	59	16	0	92	5.9
Sept. 7-27.....	1420	12	.05	5.5	1.3	18	1.3	22	29	4.9	.0	1.9	.20	94	85	18	0	96	7.4
Sept. 28-30.....	6093	7.5	.06	4.2	1.6	3.8	2.1	15	8.2	1.4	.1	2.8	.20	55	39	17	4	140	7.0
Time-weighted average.....	2447	10	0.08	4.9	1.4	16	1.6	21	27	5.0	0.1	2.3	0.23	78	79	18	2	120	--

## TENNESSEE RIVER BASIN--Continued

3-4535. FRENCH BROAD RIVER AT MARSHALL, N. C.--Continued

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement at 1800)

Month	Voice-quality measurement at 1000 Hz																															Average	
	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		
October.....	67	59	64	63	62	62	62	62	60	--	--	--	60	65	64	63	64	--	62	62	62	62	64	62	61	61	61	61	--	50	48	61	
November.....	51	51	50	54	54	55	53	51	46	47	45	45	46	47	47	47	48	49	52	54	47	47	48	52	53	58	59	44	43	43	--	48	
December.....	40	40	40	40	39	39	38	39	39	39	38	37	37	35	35	35	35	32	32	32	32	34	34	32	32	32	32	32	32	32	32	35	
January.....	34	34	36	36	--	38	38	42	39	38	40	40	42	42	--	38	40	40	42	40	41	41	42	42	42	42	40	42	42	40	40	40	
February.....	39	40	40	40	40	40	41	39	40	40	40	39	39	40	40	38	39	38	38	38	38	40	41	42	41	40	39	39	38	38	--	39	
March.....	44	43	44	45	--	--	46	48	49	--	48	48	48	49	50	47	46	45	45	46	48	48	46	46	47	46	47	46	46	46	46	--	47
April.....	50	50	50	51	50	50	49	49	49	52	52	53	53	54	56	56	55	58	--	64	64	62	62	60	58	56	58	59	60	--	55	55	
May.....	58	56	59	62	60	61	--	61	64	62	64	64	62	62	62	64	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	64	
June.....	63	66	66	--	71	72	70	70	68	73	74	73	73	74	76	77	77	76	78	78	77	76	76	78	76	73	78	78	78	--	74	74	
July.....	76	77	77	74	78	75	78	79	79	79	77	74	75	72	72	74	75	73	72	73	73	73	74	75	74	77	77	75	74	74	76	75	
August.....	80	80	81	79	79	80	78	83	82	78	75	77	76	77	70	70	70	70	69	69	75	76	76	73	70	75	75	74	75	76	75	70	70
September.....	70	73	73	72	75	76	74	75	74	75	74	73	70	68	69	68	69	68	58	67	67	67	67	67	68	65	62	64	62	60	63	--	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, and 0.2 mile upstream from Spring Creek.  
DRAINAGE AREA.--1,567 square miles.  
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1947 to September 1964.  
REMARKS.--No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Col- or
														Residue at 180°C	Calculation	Calcium	Non-carbonate			
Oct. 16, 1963..		11	0.01	8.2	1.2	29	0.9	26	60	6.7	0.1	0.0	0.00	137	130	26	4	190	6.7	15
Nov. 16.....		10	.01	7.1	2.0	32	2.2	37	47	7.8	.1	1.5	.10	141	127	28	0	229	6.8	10
Dec. 16.....		9.1	.01	6.1	1.3	13	1.2	20	24	3.4	.1	1.1	.08	111	68	18	2	229	6.8	10
Jan. 16, 1964..		8.6	.01	5.9	1.7	11	1.2	20	24	3.4	.1	2.6	.10	71	68	22	6	114	6.5	8
Feb. 17.....		9.1	.01	4.8	.9	6.5	1.4	17	14	2.8	.0	.4	.00	49	48	16	2	73	6.5	12
Apr. 15.....		8.0	.01	3.0	.9	5.8	1.0	14	12	2.0	.1	.7	.00	39	41	11	0	66	6.4	5
May 17.....		9.5	.02	4.2	.8	9.2	1.1	22	16	2.2	.1	.0	.10	61	54	14	0	80	6.3	5
June 16.....		10	.01	4.2	1.5	13	1.8	20	27	3.4	.1	3.1	.20	75	74	16	0	108	6.4	10
July 16.....		10	.03	4.8	1.5	20	1.6	28	34	3.7	.1	.8	.10	98	91	18	0	153	6.5	17
Aug. 16.....		8.9	.06	4.2	1.6	8.2	2.4	20	16	3.0	.1	.1	.00	56	55	17	0	96	6.5	25
Sept. 21.....		11	.08	5.7	1.1	16	1.8	23	29	3.9	.0	1.2	.10	90	81	18	0	123	6.8	28

## TENNESSEE RIVER BASIN--Continued

3-4570. PIGRON RIVER AT CANTON, N. C.

LOCATION. --At gaging station, 100 feet upstream from small tributary, 200 feet downstream from Pigeon Street bridge, and 0.5 mile upstream from U.S. Highways 19 and 23 at Canton, Haywood County.

DISCHARGE MEASURED. 133 square miles, approximately.

RECORDS AVAILABLE. --Chemical analyses: October 1957 to September 1964.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Col- or
														Residue at 180°C	Calculated	Calcium-magnesium	Non-carbonate			
Oct. 2, 1963...	58	7.2	0.00	2.1	0.9	1.8	0.4	13	2.0	0.8	0.1	0.3	0.00	17	22	8	0	26	6.5	7
Nov. 6, 1963...	238	7.7	.01	2.3	.4	1.8	1.1	12	1.8	2.2	.0	.1	.00	25	23	8	0	25	6.6	5
Dec. 3, 1963...	170	6.3	.04	2.1	.1	1.2	.6	9	2.2	1.1	.0	.1	.00	16	18	6	0	19	6.3	12
Jan. 7, 1964...	515	5.8	.00	1.7	.8	1.1	.4	7	3.2	.8	.1	1.3	.00	15	18	7	2	21	6.2	8
Feb. 4, 1964...	267	6.5	.00	1.5	.2	1.0	.4	8	.8	1.3	.0	.3	.00	14	16	5	0	16	6.5	5
Mar. 4, 1964...	678	5.9	.02	1.1	.5	1.0	.3	9	1.2	1.0	.0	.2	.00	17	15	5	0	16	6.8	20
Apr. 2, 1964...	441	6.8	.01	1.3	.4	1.2	.5	10	1.2	.3	.1	1	.00	16	17	4	0	17	6.4	10
Apr. 4, 1964...	698	5.1	.01	1.7	.4	1.5	.6	11	2.4	.6	.0	.3	.00	15	16	5	0	18	6.5	6
June 2, 1964...	192	7.1	.01	1.4	.4	1.5	.9	12	1.4	.6	.0	.7	.00	15	18	5	0	23	6.5	8
July 2, 1964...	89	8.0	.01	2.6	.3	1.8	.9	12	2.4	1.3	.0	.7	.00	23	24	8	0	28	6.4	7
Aug. 4, 1964...	135	6.9	.01	2.2	.5	1.4	.8	12	1.8	.2	.0	.4	.00	20	20	8	0	26	6.5	8
Sept. 2, 1964...	418	6.7	.02	1.8	.5	1.4	.7	10	2.6	1.5	.0	.9	.00	26	21	6	0	26	6.5	8



## TENNESSEE RIVER BASIN--Continued

3-4600. CATALOOCHEE CREEK NEAR CATALOOCHEE, N. C.

LOCATION.--At gaging station at bridge on State Highway 284, 500 feet upstream from Little Cataloochee Creek, and 2 miles north of Cataloochee, Haywood County. DRAINAGE AREA.--49.2 square miles. RECORDS AVAILABLE.--Chemical analyses: October 1962 to September 1964. Water temperatures: October 1962 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 69°F June 22; minimum, freezing point on several days in December, January and February.

EXTREMES, 1962-64.--Water temperatures: Maximum, 69°F June 22, 1964; minimum, freezing point on several days in February and December 1963, January and February 1964.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>	Specific conductance (micro-mhos at 25°C)	pH	Col- or
														Residue at 180°C	Calculation				
Oct. 3, 1963...	30	8.0	0.01	1.4	0.3	1.3	0.2	8	1.6	0.4	0.1	0.4	0.00	21	18	4	17	6.9	10
Nov. 5.....	25	8.5	.02	1.1	.5	1.2	.6	9	.8	.2	.1	.1	.00	18	17	5	0	18	6.7
Dec. 3.....	41	8.6	.01	1.6	.4	1.2	.3	8	.4	1.5	.2	.0	.00	17	18	6	0	16	6.5
Jan. 6, 1964...	8	7.4	.02	1.4	.1	1.1	.2	8	1.8	.8	.0	.5	.00	16	17	4	0	15	6.7
Feb. 5.....	8	7.3	.01	1.4	.1	1.4	.3	7	1.0	1.5	.0	.2	.00	16	18	4	0	14	6.3
Mar. 3.....	260	6.2	.01	1.6	.4	1.4	.6	6	1.6	1.0	.0	.0	.00	18	16	6	0	13	6.3
Apr. 3.....	181	6.9	.02	1.1	.1	1.1	.6	8	.8	.6	.1	.0	.00	18	15	4	0	13	6.3
May 5.....	238	6.4	.01	1.0	.1	1.1	.5	7	.6	.7	.0	.3	.00	15	14	3	0	13	6.3
June 3.....	78	8.0	.01	1.0	.4	1.2	.4	8	1.6	.8	.1	.3	.00	17	18	4	0	15	6.8
July 6.....	37	8.8	.02	1.3	.2	1.3	.6	8	1.6	.9	.0	.3	.00	18	19	4	0	16	6.3
Aug. 12.....	53	8.0	.01	1.1	.4	1.2	.6	9	1.6	.2	.0	.5	.00	19	18	5	0	18	6.6
Sept. 2.....	120	7.1	.01	1.4	.2	.9	.5	8	1.2	.9	.0	.6	.00	24	17	4	0	20	6.2

## TENNESSEE RIVER BASIN--Continued

3-4600. CATALOOCHEE CREEK NEAR CATALOOCHEE, N. C.--Continued

Temperature (°F) of water, water year October 1963 to September 1964  
(Continuous ethyl alcohol-actuated thermograph)

[illegible]

TENNESSEE RIVER BASIN--Continued  
3-4607.66. PIGBON RIVER AT WATERVILLE, N. C.

LOCATION. --From tailrace of Carolina Power and Light powerplant about 7 miles below Waterville Lake at Waterville, Haywood County.  
 NAME OF AREA. --6 square miles.  
 RECORDS AVAILABLE. --Chemical analyses: October 1957 to September 1964.  
 REMARKS. --No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>	Specific conductance (micro-mhos at 25°C)	Color or pH
														Residue at 180°C	Calculation			
Oct. 14, 1963..		9.1	0.17	40	1.8	65	3.5	67	34	117	0.4	0.6	0.10	377	305	108	548	7.0
Nov. 19.....		9.9	.37	46	1.8	73	4.0	89	31	126	.5	.7	.10	409	337	120	598	6.9
Dec. 17.....		9.2	.23	38	1.2	56	2.8	68	28	100	.4	.6	.00	306	289	100	450	6.5
Jan. 14, 1964..		7.0	.06	15	1.2	20	1.8	34	13	30	.2	.2	.00	121	105	42	192	6.6
Feb. 19.....		8.1	.09	16	1.4	20	1.6	36	15	33	.2	.4	.10	124	114	44	200	6.9
Mar. 15.....		6.9	.05	8.0	.4	10	1.4	22	8.6	15	.0	.7	.00	68	62	22	106	6.5
Apr. 20.....		8.4	.05	10	1.2	13	1.4	30	10	19	.1	1	.00	86	78	30	130	6.9
May 18.....		8.7	.19	13	1.8	19	1.6	29	18	29	.1	2	.00	115	105	38	192	6.9
June 20.....		10	.29	22	1.5	34	2.0	42	22	59	.2	1	.00	203	172	61	325	7.3
July 18.....		10	.42	34	1.4	58	2.8	62	31	98	.4	.6	.00	320	267	90	500	6.8
Aug. 18.....		9.2	.36	27	1.4	40	2.8	59	22	64	.3	.4	.10	216	197	72	365	6.7
Sept. 16.....		9.3	.52	20	1.4	29	2.1	40	19	50	.3	.6	.00	177	152	55	260	7.0





3-4633. SOUTH TOE RIVER NEAR CELO, N. C.--Continued  
 TENNESSEE RIVER BASIN--Continued  
 Temperature (°F) of water, water near October 1963 to September 1964  
 (Continuous ethyl alcohol-actuated thermometer)

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

## TENNESSEE RIVER BASIN--Continued

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 1960.  
 EXTREMES, 1959-60.--Water temperatures: Maximum, 75°F Sept. 6, minimum, 34°F on many days during winter months.  
 EXTREMES, 1954-60.--Water temperatures: Maximum, 82°F July 14, 1954; minimum, freezing point on several days during winter months.  
 REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1706.

Temperature (°F) of water, water year October 1959 to September 1960

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

## TENNESSEE RIVER BASIN--Continued

## 3-4875-S. REEDY CREEK AT OREBANK, TENN.

LOCATION.--Temperature recorder at gaging station on upstream right bank at Anderson Bridge, 0.1 mile south of U.S. Highway 11W, 0.3 mile north of Orebank, Sullivan County, 1.0 mile upstream from Gaines Branch, and 9.8 miles upstream from mouth.

DRAINAGE AREA.--36.3 square miles.

RECORDS AVAILABLE.--Water temperatures: February to September 1964.

EXTREMES, February to September 1964.--Water temperatures: Maximum, 83°F July 28; minimum, 37°F Feb. 12.

REMARKS.--Some regulation at low flow caused by pumping plant 0.8 mile above recorder.

Month			Temperature (°F) of water, February to September 1964 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)																															Average	
			Day																																
February			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		
Maximum			---	---	---	---	42	42	42	40	41	41	41	40	42	42	42	44	44	44	44	44	44	44	43	42	44	44	43	43	43	41	---	---	42
Minimum			---	---	---	---	41	42	39	38	40	41	37	39	40	38	38	42	44	44	44	44	43	42	38	41	42	43	43	41	39	---	---	41	
March			42	44	47	54	50	50	50	54	54	50	50	51	51	50	52	52	51	50	50	50	48	52	54	54	52	51	53	53	50	47	51		
Maximum			41	42	44	47	49	46	47	48	50	48	46	47	46	50	49	47	47	47	45	50	48	47	46	49	52	50	46	47	49	43	42	47	
Minimum			40	43	44	51	50	50	54	51	49	48	50	51	52	54	53	56	58	62	64	64	66	66	61	63	63	60	57	62	62	60	---	59	
Maximum			43	48	53	53	51	50	50	54	51	49	48	50	51	52	54	53	57	57	58	61	60	61	59	59	59	57	56	57	59	57	---	54	
Minimum			60	59	59	63	64	64	64	65	64	63	64	64	63	60	63	65	67	67	70	69	71	71	70	72	71	70	69	68	62	65	66	66	
Maximum			56	58	57	58	61	62	63	62	64	63	63	63	59	57	60	63	64	66	67	68	69	70	70	70	69	69	68	62	60	61	63		
Minimum			65	65	65	66	69	70	72	74	76	77	78	76	75	77	76	73	75	78	80	80	80	81	78	77	77	78	80	79	77	---	75		
June			65	65	65	66	69	70	72	74	76	77	78	76	75	77	76	73	75	78	80	80	80	81	78	77	77	78	80	79	77	---	75		
Maximum			65	65	64	65	68	69	72	73	74	74	74	74	74	75	76	73	75	78	80	80	80	81	78	77	77	78	80	79	77	---	72		
Minimum			75	76	78	77	76	75	76	75	77	76	77	75	73	73	74	75	76	74	75	75	78	78	79	80	79	79	82	83	79	78	77	77	
July			74	73	76	74	72	70	71	73	73	73	73	72	71	70	71	71	73	74	73	74	76	75	76	77	75	76	76	77	75	73	74	77	
Maximum			75	76	78	77	76	75	76	75	77	76	77	75	73	73	74	75	76	74	75	75	78	78	79	80	79	79	82	83	79	78	77	77	
Minimum			74	73	76	74	72	70	71	73	73	73	73	72	71	70	71	71	73	74	73	74	76	75	76	77	75	76	76	77	75	73	74	77	
August			78	78	81	78	81	82	78	77	81	79	78	77	74	70	67	66	72	72	76	77	77	77	76	78	78	76	77	77	76	75	75	76	
Maximum			75	76	76	78	77	76	77	76	75	76	75	74	70	67	66	66	67	71	73	74	73	74	73	74	73	74	73	72	74	74	72	73	
Minimum			76	75	74	74	76	75	74	74	74	74	76	75	70	67	67	67	65	67	69	70	68	70	68	65	63	65	66	66	66	---	70		
September			73	70	68	70	72	70	69	68	68	70	66	62	60	61	62	64	65	67	66	67	68	64	60	59	60	64	65	66	---	66	---		
Maximum			73	70	68	70	72	70	69	68	68	70	66	62	60	61	62	64	65	67	66	67	68	64	60	59	60	64	65	66	---	66	---		
Minimum			73	70	68	70	72	70	69	68	68	70	66	62	60	61	62	64	65	67	66	67	68	64	60	59	60	64	65	66	---	66	---		

Temperature (°F) of water, February to September 1964  
(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)

TENNESSEE RIVER BASIN--Continued  
3-4973. LITTLE RIVER ABOVE TOWNSEND, TENN.

LOCATION--Temperature recorder at gaging station on left bank along State Highway 73, in Great Smoky Mountain National Park, 0.3 mile upstream from Rush Branch, 0.4 mile southeast of Park entrance, 2.2 miles southeast of Townsend, Blount County, and at mile 35.3.

DRAINAGE AREA.--106 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1963 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 79° June 23, 1964; minimum, 33° several days in December and January.

REMARKS.--Thermograph installed Oct. 22, 1963.

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

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 1964.

Chemical analyses, in parts per million, October 1963 to August 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Col- or
														Residue at 180°C	Calculation	Calcium	Non-carbonate		
Oct. 14, 1963...	157	10	0.12	3.0	0.9	41	1.8	70	33	3.2	0.4	2.3	0.10	195	130	11	0	205	6.5
Nov. 4.....	27	7.4	0.14	1.8	1.0	11.7	.6	21	13	.4	.4	.1	.1	0	0	8	0	26	6.7
Nov. 30.....	210	8.8	.01	1.8	1.0	11.7	.6	21	13	.4	.4	.1	.1	0	0	8	0	26	6.5
Dec. 20.....	210	8.8	.01	1.8	1.0	11.7	.6	21	13	.4	.4	.1	.1	0	0	8	0	26	6.5
Jan. 22, 1964...	408	6.8	.03	1.8	.6	8.2	.8	18	9.2	.2	.1	.5	.00	54	37	7	0	52	7.1
Jan. 26.....	1200	7.9	.01	2.1	.3	1.8	.7	10	1.6	1.8	.1	.0	.10	21	21	6	0	22	6.3
Mar. 4.....	1580	7.3	.05	1.6	.2	3.1	.6	11	3.8	.9	.0	.0	.00	29	23	5	0	27	6.4
Apr. 3.....	1450	7.5	.02	1.7	.2	1.2	.6	9	1.4	.8	.0	.2	.00	24	18	5	0	18	6.2
May 28.....	1070	6.3	.03	1.3	.2	1.6	.4	9	1.4	1.0	.0	.1	.00	16	16	4	0	20	6.1
June 2.....	419	8.0	.06	1.6	.4	9.7	.8	21	10	1.6	.1	.1	1.1	61	43	6	0	59	6.5
July 30.....	1070	6.8	.04	1.5	.5	1.6	.6	10	1.0	1.0	.0	.0	.00	20	43	6	0	29	6.8
Aug. 5.....	645	7.0	.03	1.8	.6	4.1	.9	14	5.0	1.1	.0	.5	.00	36	28	7	0	44	6.3

## TENNESSEE RIVER BASIN--Continued

3-5130. TUCKASGEE 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 1964.

Chemical analyses, in parts per million, October 1963 to August 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>	Specific conductance (micro-mhos at 25°C)	Color or pH
														Residue at 180°C	Calculation			
Oct. 29, 1963...	365	9.4	0.08	2.6	0.4	21	1.5	29	27	0.4	0.2	1.1	0.20	113	78	8	112	6.9
Nov. 29.....	2900	6.4	.06	2.3	1.2	10	1.0	17	16	1.5	.2	1.3	.00	56	48	11	73	6.2
Dec. 10.....	638	7.6	.03	1.9	.8	6.3	1.0	14	7.0	1.0	.1	1.1	.10	44	34	8	0	6.0
Jan. 30, 1964...	1650	7.1	.03	1.9	.1	1.5	.7	2	5.6	1.4	.0	3.6	.00	24	23	6	4	4.9
Feb. 14.....	1030	8.0	.04	2.2	.3	5.3	.9	14	6.8	1.8	.1	.0	.00	35	32	6	0	6.1
Mar. 31.....	2850	6.7	.03	1.4	.5	3.4	.5	11	4.0	.4	.0	.2	.00	30	22	6	0	6.2
Apr. 16.....	3210	7.2	.03	1.5	.3	2.8	.6	11	3.6	.6	.0	.1	.00	27	23	6	0	6.2
May 27.....	1460	7.2	.02	1.6	.2	4.9	.7	14	5.2	1.4	.0	.3	.00	30	29	5	0	6.3
June 26.....	820	7.9	.04	2.1	.3	7.5	1.1	18	9.0	.9	.0	.8	.00	48	39	6	0	6.6
July 27.....	815	7.9	.05	2.1	.4	9.2	1.1	19	10	1.9	.1	.2	.10	52	42	7	0	6.9
Aug. 3.....	914	8.1	.01	2.4	.9	13	1.1	26	14	1.1	.1	.9	.10	83	55	10	0	6.2

## TENNESSEE RIVER BASIN--Continued

3--5183. LITTLE TENNESSEE RIVER BELOW CHILHOWEE DAM, TENN.

LOCATION.--Temperature recorder at gaging station on right bank on U.S. Highway 129, at Tallassee, 100 feet upstream from Cochran Creek, 0.8 mile downstream from Chilhowee Dam, 20 miles south of Maryville, Blount County, and at mile 32.8.

DRAINAGE AREA.--1,987 square miles, including Cochran Creek.

RECORDS AVAILABLE.--Water temperatures: October 1963 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 82°F Aug. 29; minimum 40°F Jan. 15, 16.

REMARKS.--Records furnished by Tennessee Valley Authority.

Month	Temperature (°F) of water, water year October 1963 to September 1964 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermometer)																																Average
	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		
October	Maximum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	68	68	68	67	68	68	68	68	68	69	67	67	66	66	---		
Maximum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	64	63	63	63	64	64	64	64	65	65	65	65	64	64	61	---	
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	60	59	60	59	61	62	60	60	60	59	60	60	59	58	---		
November	Maximum	64	64	63	62	62	63	64	63	64	63	62	60	60	60	60	60	59	61	59	61	62	60	60	60	59	60	60	59	58	---		
Maximum	62	61	59	60	61	62	61	60	60	60	59	59	57	57	57	56	55	57	58	57	58	58	59	58	58	57	57	58	55	55	---		
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	47	47	46	45	45	44	44	41	43	43	42	44	42	42	48		
December	Maximum	57	55	56	55	54	53	52	53	52	52	52	51	50	49	47	46	46	45	46	46	48	47	45	48	46	47	47	45	48	46		
Maximum	51	53	54	52	52	52	52	51	49	49	50	51	50	48	49	48	47	46	44	44	43	43	42	43	42	42	41	42	44	45	42		
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
January	Maximum	45	46	47	46	47	45	46	46	47	46	47	45	45	46	43	44	46	45	46	46	48	47	45	48	46	47	47	45	48	46		
Maximum	43	41	42	44	41	44	45	45	45	41	42	44	42	42	40	40	41	41	42	43	43	44	42	42	41	42	41	42	44	45	42		
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
February	Maximum	48	47	45	45	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	43	43	42	44	44	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
March	Maximum	---	---	---	---	---	48	53	51	51	49	49	54	49	48	48	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	---	---	---	---	---	---	46	47	47	47	47	46	44	47	47	47	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
April	Maximum	---	---	---	---	---	---	---	---	---	54	51	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
May	Maximum	57	54	56	55	55	55	55	53	53	53	52	53	53	56	55	56	58	57	55	56	58	57	59	60	57	58	58	55	58	59	56	
Maximum	53	53	54	52	52	52	52	51	51	51	51	50	50	50	50	50	50	51	52	52	52	52	53	53	53	54	54	55	53	54	52	52	
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
June	Maximum	56	59	57	56	57	56	57	58	57	58	58	58	58	58	58	58	58	58	58	58	59	60	61	61	60	61	63	62	62	---	---	
Maximum	54	54	54	54	54	55	54	54	54	54	54	54	55	55	55	55	55	55	56	56	56	57	57	57	56	56	57	57	58	57	55	55	
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
July	Maximum	59	61	62	64	63	61	59	59	61	62	62	60	61	62	61	59	61	60	62	58	61	59	59	60	61	64	63	61	64	65	64	
Maximum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---</						



## TENNESSEE RIVER BASIN--Continued

## 3--5185. TELlico RIVER AT TELlico PLAINS, TENN.

LOCATION.--Temperature recorder at gaging station on right bank, 200 feet upstream from bridge on Tellico plains-Rafter Road, 0.4 mile downstream from Laurel Creek, 0.8 mile east of Tellico plains, Monroe County, and at mile 28.2.

DRAINAGE AREA.--118 square miles.

RECORDS AVAILABLE.--Water temperatures: July to September 1964.

REMARKS.--Records furnished by Tennessee Valley Authority.

Month	Temperature (°F) of water, July to September 1964 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)																															Average
	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	
July	--	--	--	--	--	--	--	--	--	81	82	81	75	80	79	80	81	78	79	75	81	83	85	82	83	77	82	85	84	85	87	--
Maximum ...	--	--	--	--	--	--	--	--	--	81	82	81	75	80	79	80	81	78	79	75	81	83	85	82	83	77	82	85	84	85	87	--
Minimum ...	--	--	--	--	--	--	--	--	--	74	72	74	71	70	70	73	72	72	71	72	70	73	74	75	75	69	72	74	76	75	76	--
August	85	87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum ...	85	87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum ...	76	76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum ...	--	--	--	79	80	80	80	78	78	78	77	77	75	73	72	73	72	70	73	75	75	74	73	73	69	68	72	72	71	71	71	74
Minimum ...	--	--	--	70	70	70	70	69	68	68	70	72	69	66	63	64	65	67	68	68	68	68	68	66	60	60	65	69	69	68	--	67

Temperature (°F) of water, July to September 1964

(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)

## TENNESSEE RIVER BASIN--Continued

3-5280. CLINCH RIVER ABOVE TAZEWELL, TENN.

LOCATION.--Temperature recorder at gaging station, 0.4 mile upstream from Grison Island, 4.6 mile downstream from Big War Creek, 10.1 miles east of Tazewell, Claiborne County, and at mile 159.8.

DRAINAGE AREA.--1,474 square miles.

RECORDS AVAILABLE.--Water temperatures: March 1962 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 88°F June 20, 23, 24; minimum, freezing point Jan. 5-9.

EXTREMES, 1962-64.--Water temperatures: Maximum, 88°F June 20, 23, 24, 1964; minimum, freezing point on many days during winter months.

REMARKS.--Records furnished by Tennessee Valley Authority.

Month	Day																																Average
	Temperature (°F) of water, water year October 1963 to September 1964																																
	(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermometer)																																
October	70	70	71	71	70	71	71	70	71	69	69	68	68	69	67	66	66	66	65	67	67	64	68	68	69	66	66	62	61	59	68		
Maximum	62	64	65	64	63	64	63	61	58	58	60	57	56	56	54	53	52	52	53	57	55	56	58	58	58	58	54	49	47	58			
Minimum	55	53	50	49	51	52	53	52	52	50	46	44	46	46	47	48	52	51	53	55	54	52	50	49	50	52	46	--	50				
November	51	48	45	45	49	51	52	51	50	49	49	46	44	43	42	42	41	44	48	47	50	50	50	48	46	48	49	50	46	43	--	47	
Maximum	43	42	41	40	39	40	39	38	38	39	39	39	39	36	35	34	34	34	34	34	34	34	34	34	34	34	34	34	33	33	36		
Minimum	42	41	40	38	39	38	37	37	37	37	37	36	36	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	35		
December	34	34	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	36		
Maximum	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	32	32	35	
Minimum	39	40	39	39	39	39	40	39	39	39	39	39	39	39	39	39	39	40	41	41	41	40	40	40	40	40	40	40	40	40	40	40	
January	38	38	38	37	37	39	39	39	39	38	38	39	38	39	38	39	39	39	40	41	41	40	39	39	39	39	39	39	39	39	39	39	39
Maximum	40	40	42	44	46	46	46	46	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
Minimum	39	39	40	42	44	46	46	46	48	48	47	47	47	48	48	48	48	48	47	47	46	46	45	46	49	49	49	47	46	46	46	46	
February	47	49	50	51	51	53	53	53	52	51	52	52	52	53	55	57	59	61	62	64	65	64	64	64	64	63	63	64	65	--	57		
Maximum	45	46	49	50	50	51	51	52	51	50	51	52	52	53	54	55	57	59	61	62	64	63	63	63	62	62	63	64	--	56			
Minimum	65	65	66	68	70	71	72	74	73	73	75	75	75	75	73	73	75	78	79	81	82	83	83	81	80	81	79	76	72	75			
March	64	65	64	65	67	69	70	71	72	72	73	74	73	73	74	75	76	78	80	81	81	77	74	76	72	68	70	73					
Maximum	72	70	70	70	71	72	73	73	76	79	81	80	83	83	83	82	83	84	86	87	88	88	85	86	85	85	84	--	80				
Minimum	70	67	68	67	67	69	70	72	75	77	78	79	81	80	79	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
April	82	82	84	83	80	80	81	80	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maximum	79	78	79	79	76	75	76	78	76	76	76	75	74	74	76	77	76	77	76	77	77	77	77	77	77	77	77	77	77	77	77	77	
Minimum	81	81	82	82	79	80	80	79	78	78	78	77	76	76	74	71	71	72	74	76	78	79	80	81	81	82	82	81	80				
May	79	79	80	78	78	78	77	76	76	74	71	71	72	74	76	78	79	80	80	80	80	80	80	80	80	80	79	78	77	76			
Maximum	80	80	79	79	80	80	79	78	78	78	78	78	78	78	78	78	78	78	78	78	78	77	77	77	77	76	76	74	73				
Minimum	77	76	76	77	75	75	73	73	70	68	70	72	67	64	62	61	65	68	71	70	71	72	65	62	61	63	67	68	--	69			



## TENNESSEE RIVER BASIN--Continued

3--5320. POWELL RIVER NEAR ARTHUR, TENN.

LOCATION.--Temperature recorder at gaging station on left bank 500 feet upstream from bridge on U.S. Highway 25E, 2.3 miles east of Arthur, Claiborne County, 2.4 miles downstream from Indian Creek, and at mile 65.4.

DRAINAGE AREA.--685 square miles.

RECORDS AVAILABLE.--Water temperatures October 1963 to September 1964.

EXTREMES, 1962-64.--Water temperatures Maximum, 85°F June 23, July 27, Aug. 3, 1964; minimum, freezing point Dec. 15 to Jan. 7, Jan. 16-18.

EXTREMES, 1962-64.--Water temperatures Maximum, 85°F June 23, July 27, Aug. 3, 1964; minimum, freezing point on many days during 1962-64.

REMARKS.--Records furnished by Tennessee Valley Authority.

Month	Temperature (°F) of water, water year October 1963 to September 1964 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)																															
	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	
October	66	67	68	68	67	67	67	67	67	65	65	65	64	64	63	61	61	60	60	62	62	62	62	64	64	64	63	60	56	54	64	
Maximum	61	62	63	62	62	62	62	63	60	60	61	60	59	59	58	57	56	55	55	57	57	57	57	59	60	60	60	54	51	50	59	
Minimum	54	50	48	47	48	52	52	52	52	51	49	46	43	45	47	51	49	52	53	53	50	47	46	49	51	51	44	---	49	---	46	
November	50	47	44	47	48	51	50	49	48	48	46	43	42	41	41	40	44	47	47	49	49	47	44	46	46	48	43	42	---	46	---	46
December	43	41	40	39	38	39	38	38	38	38	40	39	35	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Maximum	41	40	38	37	38	37	36	36	37	38	39	35	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34
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	34
January	32	32	32	32	32	32	36	37	42	42	41	40	39	38	36	34	33	35	38	40	41	42	44	44	44	43	42	39	38	38	38	38
Maximum	32	32	32	32	32	32	32	32	34	36	41	39	37	36	33	32	33	35	37	39	40	41	42	41	42	41	39	36	37	36	37	36
Minimum	41	40	40	40	39	42	42	41	42	41	41	41	40	42	42	43	43	43	42	41	40	42	41	40	41	41	41	41	41	41	41	41
February	41	40	40	40	39	42	41	39	40	40	39	39	40	40	38	40	41	42	42	41	39	38	39	40	40	39	39	38	---	---	---	39
Maximum	41	42	45	48	47	46	47	50	50	49	48	48	49	48	49	48	48	48	46	45	49	51	51	52	51	50	49	47	48	47	48	48
Minimum	40	41	42	45	45	44	45	44	45	47	47	45	45	47	47	45	47	46	46	47	46	45	47	50	50	48	49	48	46	44	44	46
March	48	50	53	52	53	55	55	55	53	52	53	53	54	56	57	57	60	61	64	66	67	66	63	65	64	64	62	64	64	64	64	64
Maximum	44	47	50	51	51	53	53	53	51	49	49	51	53	54	53	55	58	59	62	63	63	62	61	63	61	60	60	61	60	---	---	---
Minimum	65	64	66	67	68	70	69	71	70	69	69	70	72	68	69	71	72	74	75	76	77	78	76	76	78	78	76	73	71	71	72	72
April	60	63	61	62	63	65	66	65	67	66	67	67	64	62	64	66	67	68	70	71	72	72	71	71	73	72	69	66	68	67	---	---
Maximum	67	67	66	65	68	70	74	73	74	76	79	78	81	80	80	80	79	81	83	84	85	83	82	82	82	82	81	---	---	---	---	---
Minimum	87	85	84	83	84	86	88	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
May	80	79	82	81	80	80	81	81	81	82	81	81	76	78	79	78	80	79	76	78	79	81	82	83	84	85	84	82	82	83	81	81
June	76	75	76	73	72	74	76	75	75	76	72	72	72	74	72	74	72	75	74	73	75	76	77	78	79	79	78	80	79	78	77	75
July	83	84	85	84	77	78	77	76	78	77	77	79	76	75	76	77	76	74	76	78	78	77	79	78	79	78	80	81	80	78	79	77
August	78	78	79	76	75	74	74	74	74	74	74	75	71	70	67	66	65	68	69	70	73	74	75	74	73	74	73	74	76	75	73	73
September	78	78	78	79	78	78	77	77	77	78	77	78	74	72	70	69	68	69	71	72	72	72	71	68	67	68	67	68	67	66	---	---
Maximum	73	73	72	74	73	72	72	71	71	72	72	69	67	65	65	66	67	70	70	70	70	70	67	64	62	64	67	66	65	---	---	---
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---



## TENNESSEE RIVER BASIN—Continued

3-5382.5. EAST FORK POPLAR CREEK NEAR OAK RIDGE, TENN.

LOCATION --Temperature recorder at gaging station near left bank on county road bridge, 0.3 mile north of State Highway 95, 1.7 miles upstream from Bear Creek, and 2.8 miles southwest of intersection of State Highway 95 and Anderson County line in Oak Ridge.

DRAINAGE AREA --19.5 square miles.

RECORDS AVAILABLE --Water temperatures:

Maximum, 76°F June 23, Aug. 3, 4, 31; minimum, 38°F Dec. 20, 21.

EXTREMES, 1963-64. --Water temperatures:

Maximum, 78°F July 16, 1963; minimum, 35°F Dec. 13, 1962.

EXTREMES, 1961-64. --Water temperatures:

Maximum, 78°F July 16, 1963; minimum, 35°F Dec. 13, 1962.

Temperature (°F) of water, water year October 1963 to September 1964  
(Recorder with temperature attachment, 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	64	66	66	64	64	64	64	64	63	63	64	64	64	63	63	62	62	61	62	63	63	63	65	66	66	65	65	64	59	57	
	Minimum	62	62	63	63	62	62	62	62	61	61	62	63	61	61	61	60	60	58	58	58	60	61	61	63	64	64	63	64	59	54	61	
November	Maximum	57	57	52	52	56	58	58	54	54	53	52	51	50	50	48	48	48	51	55	56	57	58	59	52	53	56	58	52	50	55	53	
	Minimum	37	32	49	49	52	56	57	54	53	53	52	51	50	50	48	48	48	48	48	51	55	56	57	58	59	52	49	51	53	56	52	
December	Maximum	50	48	48	48	47	47	47	48	48	46	48	50	50	50	46	41	40	42	41	39	39	40	40	40	40	42	44	44	43	41	40	
	Minimum	48	47	48	46	47	46	47	46	47	46	46	46	48	50	46	41	39	39	40	39	38	38	39	39	40	40	42	43	41	40	43	
January	Maximum	42	43	45	47	47	45	46	47	47	47	45	47	47	46	43	42	43	46	47	48	47	47	48	48	48	47	47	46	45	47	46	
	Minimum	40	42	43	45	44	44	40	45	46	45	43	45	44	42	41	41	42	43	45	47	44	45	47	48	47	44	46	45	43	44	45	
February	Maximum	48	48	47	47	48	47	47	46	46	46	46	46	45	46	45	45	47	47	47	47	47	47	47	46	47	47	47	47	47	47	47	
	Minimum	47	46	44	44	44	44	46	47	45	46	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	
March	Maximum	47	49	53	54	54	50	51	54	57	57	52	54	53	53	53	52	54	53	52	51	51	51	53	55	55	53	52	53	52	51	53	
	Minimum	46	47	49	52	50	50	51	54	52	50	50	51	52	51	51	50	51	48	50	51	50	50	50	49	52	55	53	48	51	50	49	
April	Maximum	54	55	58	58	57	58	60	60	56	56	58	58	59	60	61	63	65	66	67	66	65	64	64	64	64	64	62	61	61	61	61	
	Minimum	50	53	55	57	56	56	56	55	52	54	57	58	57	57	57	57	57	59	62	63	65	65	63	64	64	62	60	61	61	59	58	
May	Maximum	61	61	61	62	64	64	65	66	65	65	66	66	66	66	62	64	65	66	67	69	70	69	69	69	69	69	69	69	65	66		
	Minimum	59	61	60	61	62	62	64	64	65	64	65	64	65	66	62	60	62	64	65	66	67	67	68	69	68	67	68	69	65	62	63	
June	Maximum	65	65	66	65	66	67	68	70	71	72	73	74	72	73	74	74	74	72	73	74	75	75	76	75	74	72	73	73	73	71	70	
	Minimum	65	64	64	64	64	66	67	69	70	71	72	72	72	72	72	72	72	72	73	74	74	75	74	75	74	71	71	72	72	70		
July	Maximum	72	71	72	73	72	70	71	72	73	73	73	73	72	70	72	73	73	73	72	73	74	74	75	74	75	74	75	74	74	73	73	
	Minimum	71	70	71	72	70	67	69	70	71	71	72	72	70	68	68	70	71	72	72	72	72	73	74	74	73	74	74	73	71	71		
August	Maximum	74	74	76	76	74	74	74	74	74	74	74	71	68	67	66	67	66	67	66	66	66	66	66	66	66	66	66	66	66	66	66	
	Minimum	73	74	74	74	74	73	73	73	73	73	74	71	68	67	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	
September	Maximum	75	73	73	74	74	74	74	73	73	73	74	74	73	68	67	67	68	69	71	71	71	72	70	67	65	65	68	70	70	71	68	
	Minimum	72	70	70	70	72	72	72	70	70	70	71	73	68	65	64	65	66	67	68	69	70	70	70	67	63	62	63	65	68	70	68	



TENNESSEE RIVER BASIN--Continued  
3--5500. VALLEY RIVER AT TOMOTILA, N. C.

LOCATION.--Temperature recorder at gaging station on right bank at bridge on Secondary Road 1373 at Tomotila, Cherokee County, 0.2 mile upstream from Rogers Creek, 4.7 miles northeast of Murphy and at mile 6.4.

DRILLING.--104 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1953.

Water temperatures: October 1952 to September 1961 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 74°F June 23, 24; minimum, freezing point Dec. 20 and Jan. 15.

EXTREMES, 1952-53, 1961-64.--Water temperatures: Maximum, 74°F on several days in 1953, 1962, and 1964; minimum, freezing point on several days in 1962-64.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Color or pH
Nov. 14, 1963.	62.6	6.8	0.04	8.0	1.2	1.1	0.4	31	2.0	1.0	0.1	0.3	Residue at 180°C	36	25	0	55	7.0
May 26, 1964..	184	7.2	.02	3.0	1.3	1.3	.7	16	1.2	.9	.1	.7		24	12	0	32	6.5













## TENNESSEE RIVER BASIN--Continued

3-5922. CEDAR CREEK NEAR PLEASANT SITE, ALA.

LOCATION.--Temperature recorder at gaging station at bridge, 2.6 miles east of Pleasant Site, and 4.3 miles upstream from Little Bear Creek.  
 DRAINAGE AREA.--189 square miles.  
 RECORDS AVAILABLE.--Water temperatures: January to September 1963.  
 EXTREMES, January to September 1963.--Water temperatures: Maximum, 84°F Aug. 28; minimum, freezing point on several days in January.  
 REMARKS.--No readings Jan. 1-16, July 1-10, 18-24. Records furnished by Tennessee Valley Authority.

Month	Temperature (°F) of water, January to September 1963 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)																																Average
	Day																																
January	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	49	52	47	44	46	47	47	45	43	46	46	42	41	42	41	40	41	40	43	47	47	40	40	45	47	47	43	45	---	---	---		
Minimum	43	47	43	40	42	43	45	42	40	42	41	39	38	39	38	36	36	37	39	41	40	35	35	40	40	43	38	42	---	---	---		
February	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	48	49	52	60	61	57	53	53	53	54	60	61	60	60	56	58	63	62	66	64	59	55	56	58	59	62	60	63	64	66	66	59	
Minimum	45	45	46	52	57	52	49	48	51	49	54	59	57	56	52	53	58	59	62	59	55	50	50	52	57	58	56	57	59	60	61	54	
March	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	67	69	70	70	67	60	62	63	66	66	66	66	64	63	62	67	71	71	71	73	75	75	74	68	64	65	64	63	66	66	---	67	
Minimum	61	63	66	67	60	56	55	57	62	64	63	62	60	57	57	61	66	69	67	72	72	68	64	61	59	63	61	63	63	---	---	63	
April	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	59	56	59	62	63	64	65	66	68	71	71	71	70	69	70	72	70	68	70	68	66	63	62	66	65	65	65	65	65	65	65	66	
Minimum	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
May	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	63	61	63	65	67	67	69	70	72	73	75	75	74	73	73	75	75	74	73	72	71	70	67	68	68	66	68	67	68	68	68	70	
Minimum	57	56	59	62	63	64	65	66	68	71	71	71	70	69	70	72	70	68	70	68	66	63	62	66	65	65	65	65	65	65	65	66	
June	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	70	70	70	71	73	74	76	77	78	79	80	78	79	81	80	77	75	75	76	76	74	72	71	73	74	74	73	72	73	74	---	75	
Minimum	67	67	67	68	68	69	71	73	74	75	75	74	74	76	77	74	73	71	72	73	72	71	70	67	68	70	72	71	69	68	70	---	71
July	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	78	80	80	81	82	81	81	80	80	81	80	81	80	78	75	75	76	78	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Minimum	75	78	77	76	77	77	78	77	76	76	78	75	76	75	72	70	71	73	75	77	75	75	75	75	75	75	76	76	76	76	76	76	
August	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	78	80	80	81	82	81	81	80	80	81	80	81	80	78	75	75	76	77	80	80	80	79	80	79	80	80	81	82	84	81	80	79	
Minimum	75	78	77	76	77	77	78	77	76	76	78	75	76	75	72	70	71	73	75	77	75	75	75	75	75	75	75	76	76	76	76	76	
September	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Maximum	78	80	80	81	80	78	78	78	80	79	78	76	75	75	77	77	78	77	77	76	75	72	70	69	68	65	68	65	66	---	---	71	
Minimum	74	75	75	77	77	75	73	71	72	72	73	74	73	73	72	72	72	71	70	69	70	68	65	63	64	67	65	62	60	---	---	---	

Temperature (°F) of water, January to September 1963

(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)







TENNESSEE RIVER BASIN--Continued  
3-5925. BEAR CREEK AT BISHOP, ALA.

LOCATION.--Temperature recorder at gaging station at bridge, 0.5 mile downstream from Cedar Creek, and 0.8 mile southwest of Bishop, Colbert County.  
DRAINAGE AREA.--667 square miles.  
RECORDS AVAILABLE.--Water temperatures: February 1962 to September 1963.  
REMARKS.--Water temperatures: Maximum, 82°F; minimum, 33°F Jan. 25-30.  
EXTREMES, February 1962 to September 1963.--Water temperatures: Maximum, 86°F July 13, 1962; minimum, 33°F Jan. 25-30, 1963.  
REMARKS.--Records furnished by Tennessee Valley Authority.

Month	Temperature (°F) of water, water year October 1962 to September 1963 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermometer)																																Average			
	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					
October	66	67	67	67	67	68	69	69	72	71	70	70	72	73	72	72	72	70	69	68	69	68	66	64	60	58	55	56	57	59	60	67				
Maximum	65	65	65	65	67	68	68	69	69	69	69	69	70	70	70	70	70	68	67	66	67	66	64	60	58	55	56	57	59	60	67					
Minimum	57	56	56	55	53	51	52	52	51	51	52	52	51	52	54	55	54	53	54	54	53	52	51	50	51	50	50	51	52	51	52	53				
November	55	55	54	53	51	51	51	51	51	49	49	50	51	50	51	52	54	53	53	52	53	53	51	50	51	50	49	49	50	51	51	52	53			
Maximum	52	52	51	52	52	51	47	46	43	42	40	35	34	34	34	36	36	37	39	41	45	46	46	41	42	42	42	43	43	43	43	43	43			
Minimum	52	51	51	51	51	47	46	46	43	42	40	35	34	34	34	34	35	35	37	39	41	45	46	41	41	42	41	42	43	41	42	41	42			
December	42	41	41	41	42	43	43	43	44	46	49	49	49	44	39	38	37	38	40	40	40	38	37	34	34	34	34	33	33	33	35	40	40			
Maximum	41	40	40	40	41	42	43	43	42	44	46	49	44	39	36	35	35	36	38	40	37	36	37	34	33	33	33	33	33	33	35	38	38			
Minimum	39	41	44	43	43	43	44	44	42	42	43	42	40	40	40	39	38	39	40	41	42	40	39	40	41	44	42	42	42	42	42	42	42	41		
January	46	48	50	54	58	57	54	53	52	52	58	59	60	58	55	58	59	61	61	60	57	56	56	57	59	59	61	62	64	65	57	55	57			
Maximum	43	46	47	49	54	54	52	52	50	51	57	59	58	54	54	55	58	59	60	57	55	54	55	56	57	58	58	60	61	62	64	65	57			
Minimum	39	41	44	43	43	43	44	44	42	42	43	42	40	40	40	39	38	39	40	41	42	40	39	40	41	44	42	42	42	42	42	42	42	41		
February	66	67	68	68	67	64	60	62	63	64	64	65	64	64	63	64	68	69	69	71	72	73	73	73	73	71	68	65	64	65	65	65	66	66		
Maximum	63	63	65	66	64	60	58	59	61	62	63	63	62	61	60	60	63	66	67	67	69	70	71	67	64	63	63	62	63	64	--	64	--	64		
Minimum	64	62	63	64	65	67	68	70	71	73	73	73	73	73	73	73	74	75	75	74	74	72	72	69	69	67	68	69	70	69	69	69	69	69		
March	62	61	60	62	64	65	66	67	69	70	71	72	71	70	70	71	71	70	71	70	69	67	67	67	66	66	67	68	68	67	68	67	67	67		
April	69	70	70	70	71	73	75	76	77	78	79	79	79	80	80	78	76	75	73	74	74	72	72	72	73	73	73	73	74	--	75	--	75	--	75	
Maximum	67	68	69	69	71	72	73	74	75	76	76	76	76	77	77	76	75	73	74	74	72	71	71	71	71	72	72	71	71	72	--	72	--	72		
Minimum	67	68	69	69	71	72	73	74	75	76	76	76	76	77	77	76	75	73	74	74	72	71	71	71	71	72	72	71	71	72	--	72	--	72		
May	73	74	74	75	75	77	78	77	77	76	76	76	76	75	75	75	78	79	79	79	79	79	79	79	78	73	74	75	76	77	76	76	76	76		
June	72	72	73	73	74	75	76	76	76	75	73	73	73	74	74	73	74	75	76	77	77	76	77	76	71	72	72	73	74	75	75	74	74	74	74	
July	78	80	81	81	81	82	81	81	81	81	80	80	80	79	78	77	78	79	78	79	78	77	78	77	78	80	81	81	80	78	79	79	79	79		
Maximum	76	77	78	79	80	80	80	79	79	79	79	79	79	79	79	78	76	76	76	76	76	75	75	75	75	77	77	78	79	78	77	78	77	78	77	
Minimum	78	80	81	81	81	82	81	81	81	81	80	80	80	79	78	77	78	79	78	79	78	77	78	77	78	80	81	81	80	78	79	79	79	79		
August	76	77	78	79	80	80	80	79	79	79	79	79	79	79	79	78	76	76	76	76	76	75	75	75	75	77	77	78	79	78	77	78	77	78	77	
September	78	79	80	77	81	80	79	79	79	79	78	79	76	75	75	77	78	77	75	75	75	72	71	70	69	66	64	65	64	65	--	71	--	71		
Maximum	76	76	76	77	76	77	76	74	74	75	75	75	73	73	73	73	73	71	70	69	69	68	66	65	64	64	62	61	--	71	--	71	--	71		
Minimum	76	76	76	77	76	77	76	74	74	75	75	75	73	73	73	73	73	71	70	69	69	68	66	65	64	64	62	61	--	71	--	71	--	71		

## TENNESSEE RIVER BASIN--Continued

3--5925. BEAR CREEK AT BISHOP, ALA.

LOCATION.--Temperature recorder at gaging station (on left bank), 20 feet upstream from highway bridge, 0.5 mile downstream from Cedar Creek, and 0.8 mile southwest of Bishop, Colbert County.

DRAINAGE AREA.--667 square miles.

RECORDS AVAILABLE.--Water temperatures: February 1962 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 85°F June 22, Aug. 3, Sept. 7, 8; minimum, freezing point Dec. 26, 27, Jan. 1-3.

EXTREMES, 1962-64.--Water temperatures: Maximum, 86°F July 13, 1962; minimum, freezing point Dec. 26, 27, 1963, Jan. 1-3 1964.

REMARKS.--No readings Mar. 14-23, Aug. 25 to Sept. 1. Records furnished by Tennessee Valley Authority.

Temperature (°F) of water, water year October 1963 to September 1964 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)																																	Average			
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	65	65	67	67	68	67	68	67	66	66	66	66	71	68	72	71	69	70	68	68	68	67	65	66	68	67	68	65	62	58	67				
	Minimum	60	61	62	62	63	62	61	61	61	61	61	62	64	64	64	65	64	63	62	61	61	61	61	62	63	63	64	60	58	57	62				
November	Maximum	58	58	53	53	55	56	54	54	55	54	54	52	49	49	51	54	57	60	60	60	58	58	55	53	53	54	54	53	51	---	54				
	Minimum	56	53	52	52	53	54	54	53	53	53	53	52	49	48	48	48	49	51	54	55	57	50	58	55	53	53	53	51	49	---	53				
December	Maximum	49	47	46	45	44	44	45	46	45	44	45	47	47	45	43	41	39	38	37	35	34	33	33	33	33	33	34	36	35	35	40				
	Minimum	47	46	44	44	44	43	43	43	43	43	43	43	43	43	41	39	37	37	34	33	33	33	33	32	32	32	33	34	34	34	34	39			
January	Maximum	34	32	34	36	38	41	42	44	46	46	43	42	41	38	37	35	36	37	40	46	46	47	50	55	53	51	50	47	46	46	43				
	Minimum	32	32	32	34	36	38	41	41	43	43	42	41	38	36	35	35	34	35	37	40	45	47	49	53	50	47	45	44	45	41	45	47			
February	Maximum	48	48	48	48	49	49	48	47	46	46	46	46	45	46	46	48	48	48	48	48	47	47	45	46	48	48	48	48	48	47	---	47			
	Minimum	46	47	47	47	47	48	48	46	46	46	46	45	44	45	46	46	47	47	48	47	46	45	44	44	46	48	47	47	---	---	46	---			
March	Maximum	48	51	54	57	58	56	55	56	59	59	57	55	55	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	Minimum	47	48	51	54	56	54	54	55	56	57	54	55	53	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
April	Maximum	56	59	60	61	62	64	66	67	64	61	61	62	63	64	64	65	66	68	68	68	67	67	68	67	67	66	67	66	67	66	---	64			
	Minimum	54	56	58	60	61	61	64	64	60	60	60	59	60	62	63	63	64	65	67	68	67	67	68	66	66	65	66	66	64	---	---	---	63		
May	Maximum	64	65	67	68	68	68	68	68	68	68	70	70	70	70	69	69	70	71	73	74	76	76	76	76	76	77	78	79	79	76	75	72	71		
	Minimum	63	64	63	64	67	67	66	67	68	67	68	69	69	67	67	67	67	68	69	71	72	73	73	74	74	75	76	74	71	69	69	---	---		
June	Maximum	69	70	71	71	72	73	75	76	77	77	79	80	80	81	81	80	80	81	82	84	85	84	82	81	83	84	80	78	---	---	---	---	---		
	Minimum	68	67	68	68	69	71	71	72	74	76	76	78	79	80	79	78	79	79	80	81	80	80	79	79	79	79	78	77	---	---	---	---	---		
July	Maximum	79	79	79	80	79	79	79	82	80	80	79	77	76	75	76	76	78	79	78	80	81	82	80	80	80	80	80	80	81	81	84	79	---		
	Minimum	76	77	76	77	77	76	77	76	77	78	79	77	76	73	73	74	75	76	78	78	80	78	79	78	79	78	79	78	80	79	80	77	77		
August	Maximum	84	82	85	84	82	84	84	84	83	81	83	80	78	76	73	73	74	76	77	79	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
	Minimum	80	80	80	81	82	80	81	80	80	80	80	80	77	76	73	71	70	72	73	75	76	77	77	77	77	77	77	77	77	77	77	77	77	77	
September	Maximum	---	83	82	83	84	85	85	83	83	81	80	80	78	79	78	74	75	79	79	79	79	78	79	78	79	78	74	73	74	72	71	71	---	79	
	Minimum	---	80	78	73	79	79	79	78	77	78	77	76	74	72	71	71	72	73	74	75	76	76	76	74	71	69	71	69	71	70	70	---	75		

Temperature (°F) of water, water year October 1963 to September 1964  
(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)



## TENNESSEE RIVER BASIN--Continued

3-6025. PINNEY RIVER AT VERNON, TENN.

LOCATION.--Temperature recorder at gaging station on left bank, 350 feet upstream from county highway bridge, 400 feet upstream from Pretty Creek, 0.2 mile northeast of Vernon, Hickman County, 2.2 miles downstream from Mill Creek, 8.6 miles north of Centerville and 8.4 miles upstream from mouth.

DRAINAGE AREA.--193 square miles.

RECORDS AVAILABLE.--Water temperatures: June to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 76°F July 9, 10.

REMARKS.--Records furnished by Tennessee Valley Authority.

Temperature (°F) of water, June to September 1964

(Recorder with temperature attachment, 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		
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	74	74	73	71	73	73	72	71	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	74	74	73	71	73	73	72	71	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	72	71	70	69	70	71	70	69	--	--
July	71	72	73	73	73	72	71	75	76	76	75	72	71	71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	68	70	70	71	71	68	67	70	74	74	72	71	70	68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum	72	71	69	71	71	71	71	71	70	70	70	69	68	66	64	65	66	66	68	68	69	69	68	68	65	63	64	64	62	62	--	--	68
Minimum	70	68	68	68	69	69	70	69	68	68	69	68	65	62	61	63	65	65	67	67	68	67	65	61	61	62	59	59	61	--	--	--	66



## TENNESSEE RIVER BASIN--Continued

3-6040. BUFFALO RIVER NEAR FLAT WOODS, TENN.

LOCATION.--Temperature recorder at gaging station on right bank, 0.5 mile downstream from Little Oppossum Creek and bridge on State Highway 13, 1.3 miles north of Flat Woods, Perry County, 3.9 miles upstream from Sinking Creek, and at mile 58.7.

DRAINAGE AREA.--447 square miles.

RECORDS AVAILABLE.--Water temperatures: June to September 1964.

EXTREMES, June to September 1964.--Water temperatures: Maximum, 84°F Aug. 4.

REMARKS.--Records furnished by Tennessee Valley Authority.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Calcium sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at 25°C)	Specific conductance (micro-mhos at 25°C)	pH or Col.	Oxygen consumed
																	Calcium	Non-magnesium				
Nov. 14, 1963	181	8.7	0.02	0.00	15	2.3	0.8	0.4		56	2.6	2.5	0.0	0.1		60	47	1	103	7.8	3	
May 22, 1964.	368	4.6	.00	.00	13	1.7	1.1	.8		45	3.4	3.5	.0	.1		50	40	2	89	7.3	4	
Sept. 10.....	174	7.1	.00	.00	16	3.0	1.0	.6		62	2.4	1.1	.0	.2		58	52	2	107	7.7	3	

Temperature (F°) of water, June to September 1964

(Recorder with temperature attachment, 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	
June	Maximum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
June	Minimum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
July	Maximum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
July	Minimum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
August	Maximum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
August	Minimum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
September	Maximum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
September	Minimum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...



## OHIO RIVER MAIN STEM

3-6115. OHIO RIVER AT METROPOLIS, ILL.

LOCATION.--Temperature recorder at gaging station near center span of downstream side of pier 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 1964.

EXTREMES, 1963-64.--Water temperatures: Minimum, 33°F Jan. 17-23.

EXTREMES, 1954-64.--Water temperatures: Maximum, 88°F Aug. 3-6, 1955; minimum, freezing point on many days during February 1958, and January and February 1963.

REMARKS.--Temperature recorder not operating Feb. 4 to Mar. 1, Mar. 17 to Sept. 24.

Temperature (°F) of water, water year October 1963 to September 1964  
(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 ....	71	71	71	71	70	69	69	69	69	69	69	69	69	69	68	68	68	67	67	67	67	67	67	67	66	66	66	66	66	66	65	68	
Minimum ....	71	71	71	70	69	69	69	69	69	69	69	69	69	69	68	68	67	67	67	67	67	67	67	67	66	66	66	66	66	66	65	68	
November																																	
Maximum ....	61	61	60	59	58	56	55	54	54	54	54	54	54	54	52	52	50	50	50	50	50	50	50	50	50	50	49	49	49	49	53		
Minimum ....	61	60	59	58	56	55	54	54	54	54	54	54	54	54	52	50	50	50	50	50	50	50	50	50	50	50	49	49	49	49	53		
December																																	
Maximum ....	49	49	49	48	45	44	43	43	43	43	43	43	43	42	42	41	40	39	38	37	37	37	37	36	36	35	34	34	34	34	40		
Minimum ....	49	49	48	45	44	43	43	43	43	43	43	43	43	42	42	41	40	39	38	37	37	37	37	36	35	34	34	34	34	34	40		
January																																	
Maximum ....	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	33	33	34	40	
Minimum ....	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	33	33	34	40	
February																																	
Maximum ....	37	37	37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum ....	37	37	37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
March																																	
Maximum ....	--	45	47	50	51	51	51	51	51	51	51	51	52	53	54	54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum ....	--	45	47	50	51	51	51	51	51	51	51	51	51	52	53	54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
April																																	
Maximum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
May																																	
Maximum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
June																																	
Maximum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
July																																	
Maximum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
August																																	
Maximum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
September																																	
Maximum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum ....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	



## OHIO RIVER MAIN STEM--Continued

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, near Grand Chain, Pulaaki 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.

RECORDS AVAILABLE.--203,100 square miles.

REMARKS.--Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September). Records of discharge are given for gaging station at Metropolis, Ill.

EXTREMES 1963-64.--Specific conductance: Maximum, 88°F July 15; minimum, 34°F Jan. 14. 15. 1964.

Water temperatures: Maximum, 88°F July 15; minimum, 34°F Jan. 14. 15. 1964.

EXTREMES 1964-65.--Specific conductance: Maximum daily, 684 micromhos Nov. 16, 1962; minimum daily, 170 micromhos Feb. 9, 1957.

Water temperatures (1954-62, 1963-64): Maximum, 88°F July 15, 1964; minimum, freezing point on many days during winter months.

REMARKS.--Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, and (3) maximum daily specific conductance for each 10-day period (October to December) or each week (January to September). Records of discharge are given for gaging station at Metropolis, Ill.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at 25°C)	pH	Detergent (MB AS)
																		Calcium, magnesium	Non-bicarbonate			
Oct. 1, 1963.	57800					30	12				88	39	18		2.9		162	125	52	288	7.3	--
Oct. 16, 1963.	60900					--	--	--	--	--	--	35	--	--	--	0.16	--	--	--	267	7.6	0.0
Oct. 24, 1963.	59300					27	5.8				80	26	15		1.8		136	92	26	230	6.6	--
Oct. 27, 1963.	42900					--	--	--	--	--	--	30	--	--	--	.14	--	--	--	256	7.5	.0
Nov. 7, 1963.	81100					24	6.4				74	25	16		2.1		138	86	26	229	6.6	--
Nov. 14, 1963.	66900					38	10				132	45	33		1.9		239	136	28	399	7.3	--
Dec. 2, 1963.	86500					39	12				104	66	32		3.6	.16	255	147	62	409	6.8	--
Dec. 7, 1963.	86500					43	--				73	83	--		5.5	--	279	146	86	484	6.6	--
Dec. 27, 1963.	86600					--	--	--	--	--	--	--	58		--	--	--	--	--	480	6.6	--
Jan. 1, 1964.	65300					--	--	--	--	--	--	68	--		--	.16	--	--	--	449	6.8	--
Jan. 11, 1964.	240000					--	--	--	--	--	--	124	--		--	.23	--	--	--	592	6.7	--
Jan. 13, 1964.	263000					55	14				64	157	48		10	--	382	195	142	603	6.8	--
Jan. 21, 1964.	123000					--	--	--	--	--	--	--	--		--	--	--	--	--	A348	--	--
Jan. 25, 1964.	202000					--	--	--	--	--	--	80	--		--	.19	--	--	--	452	6.6	--
Jan. 26, 1964.	239000					--	--	--	--	--	--	80	--		--	.19	--	--	--	458	6.4	--
Feb. 1, 1964.	279000					35	8.8				66	70	30		6.1		216	124	70	371	6.9	--
Feb. 4, 1964.	212000					--	--	--	--	--	--	71	--		--	.17	--	--	--	365	6.8	--
Feb. 9, 1964.	146000					29	7.0				65	44	22		5.1		163	102	48	282	6.8	--
Feb. 15, 1964.	173000					--	--	--	--	--	--	67	--		--	.17	--	--	--	340	7.0	--
Feb. 22, 1964.	314000					--	--	--	--	--	--	63	--		--	.18	--	--	--	357	6.7	--
Mar. 3, 1964.	176000					32	9.0				80	52	19		4.5		183	117	52	297	7.1	--
Mar. 8, 1964.	620000					--	--	--	--	--	--	27	--		--	.20	--	--	--	248	7.1	--
Mar. 9, 1964.	723000					18	5.8				52	50	8.5		4.0		128	69	26	175	6.9	--



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 1963 to September 1964

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	70	72	71	--	--	--	--	--	--	--	--	--	71	71	72	--	72	71	71	71	72	72	71	--	--	--	--	--		
November.....	--	--	--	--	--	42	47	47	47	47	47	47	47	47	47	47	47	--	--	--	--	--	--	--	--	--	--	--	--	--		
December.....	--	50	50	50	50	48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	41	40	40	38	37	35	--	
January.....	37	36	36	--	38	40	38	38	38	38	38	36	34	34	35	36	36	42	43	42	43	42	43	41	42	40	38	39	39	40	39	
February.....	40	40	40	41	41	40	40	40	39	40	40	40	40	40	41	41	42	41	42	41	42	41	42	38	38	37	--	--	--	--	40	
March.....	46	47	48	48	47	48	50	48	48	48	48	48	48	48	48	48	54	54	--	--	--	--	--	47	47	48	48	50	50	50	50	50
April.....	50	50	--	--	--	54	55	55	55	56	56	56	53	52	52	53	51	51	59	59	60	60	60	62	63	--	--	63	63	--	56	
May.....	64	63	65	65	66	67	68	63	63	66	68	69	68	68	69	69	71	71	71	71	71	75	76	75	75	76	75	74	74	75	70	
June.....	74	76	75	77	73	73	--	78	78	79	79	79	78	78	78	78	79	78	--	--	--	--	84	84	85	83	83	86	86	--	80	
July.....	85	84	85	85	82	82	81	81	80	81	81	81	81	81	81	81	81	81	81	81	81	--	80	81	--	--	--	--	--	--	--	
August.....	--	--	--	86	86	87	81	81	83	82	82	80	79	79	79	79	79	80	80	80	80	80	80	80	80	80	80	80	80	81	--	
September.....	80	80	78	80	80	--	--	--	--	--	--	--	--	--	77	77	77	76	76	76	75	75	75	73	73	72	73	72	72	--	--	



## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>	Total acidity as H <sup>+</sup>	Specific conductance (micro-mhos at 25°C)	Color or pH
CLARION RIVER BASIN--Continued																			
3-305. CLARION RIVER NEAR PINEY, PA.																			
Oct. 14, 1963.	343	4.4		0.03		29	8.8	18	2.2	8	86	37	0.0	1.6	221	109	102	340	5.9
Dec. 3, 1963.	1080	5.5		.05	0.00	38	7.8	21	1.8	19	93	46	.2	.3	248	127	112	401	6.6
Apr. 14, 1964.	2880	--		--	--	--	--	D4.4	--	2	44	8.3	--	.5	--	50	49	147	5.0
June 16, 1964.	393	--		--	--	--	--	D12	--	5	88	22	--	.3	--	100	96	298	5.4
July 28, 1964.	591	--		--	--	--	--	D12	--	7	69	20	--	2.0	174	82	77	252	5.8
MONONGAHELA RIVER BASIN																			
3-570. TYGART VALLEY RIVER AT COLFAX, W. VA.																			
Oct. 30, 1963.	F360	4.7	0.1	0.10	0.50	12	3.4	2.3	1.3	0	49	1.6	0.1	0.8	77	44	44	134	4.9
Feb. 4, 1964.	F2200			.86				1.2	0	34		1.3		.5	58	30	30	104	4.4
3-585. WEST FORK RIVER AT BUTCHERSVILLE, W. VA.																			
Feb. 4, 1964.	F110			1.3		20	6.1	4.5	1.2	14	65	5.2	0.1	1.3	126	76	64	199	6.0
Apr. 17, 1964.	F117	3.6	0.5	1.7	0.52			3.8		17	63	3.8		.6	118	75	61	192	6.5
3-610. WEST FORK RIVER AT ENTERPRISE, W. VA.																			
Oct. 30, 1963.	F55	21	0.5	28	7.8	242	72	134	6.4	0	1310	15	1.3	0.4	1850	902	902	2500	2.9
Feb. 4, 1964.	F455	--	--	14	--	--	--	27	--	0	331	6.6	--	.8	518	280	280	763	3.7
Apr. 17, 1964.	F635	12	.024	0.24	2.2	103	33	38	2.1	0	520	4.9	.3	.2	774	394	394	1170	3.2
3-625. DECKERS CREEK AT MORGANTOWN, W. VA.																			
Oct. 30, 1963.	F4.5	21	5.1	3.2	2.9	166	48	52	5.0	0	743	22	1.0	0.8	1140	610	610	1370	4.1
Apr. 17, 1964.	F60	7.9	.5	9.3	.70	32	9.6	5.5	1.4	0	147	3.9	.2	.1	250	120	120	375	4.0
3-630. MONONGAHELA RIVER AT LOCK 8, AT POINT MARION, PA.																			
Oct. 29, 1963.	F350	8.0	2.1	3.7	1.2	44	12	25	2.1	0	255	5.4	0.3	0.7	355	160	160	590	3.3
Feb. 4, 1964.	F3000			.04				1.1		0	63	2.2		.5	105	54	54	192	4.1

## 3-673. BLACK FORK RIVER AT PARSONS, W. VA.

Oct. 30, 1963.	H49	4.5	0.0	0.00	0.00	0.00	17	4.0	1.7	1.0	10	48	2.0	0.0	0.2	85	58	50	138	6.6	5
Apr. 17, 1964.	H680	--	--	.53	--	--	--	--	.6	--	9	17	.7	--	.6	40	24	16	82	6.5	3

## 3-700. CHEAT RIVER AT ROWLESBURG, W. VA.

Oct. 30, 1963.	F85	1.3	0.0	0.13	0.02	14	2.4	4.5	0.9	13	34	5.8	0.1	0.0	70	45	35	126	6.8	--	
Feb. 5, 1964.	F170	--	--	.01	--	--	--	1.0	--	8	13	1.3	--	--	.7	35	18	13	32	6.1	3
Apr. 17, 1964.	F2270	3.1	.3	.21	.02	5.8	.9	.8	.5	8	12	1.0	.1	.7	34	18	12	49	6.7	4	

## 3-705. BIG SANDY CREEK AT ROCKVILLE, W. VA.

Oct. 29, 1963.	FS.2	2.9	0.1	0.10	0.17	24	8.3	3.2	1.9	6	92	3.7	0.1	0.0	141	94	89	232	6.9	0
Apr. 16, 1964.	F267	--	--	.20	--	--	--	--	--	2	25	1.5	--	.4	48	27	26	74	5.5	0

## 3-716.5. CHEAT RIVER BELOW CHEAT LAKE, NEAR POINT MARION, PA.

Feb. 4, 1964.			0.46		0.14	6.8	2.4	0.7	0.6	1	23	1.1	0.1	0.7	43	22	21	71	4.8	0
Apr. 16, 1964.		3.9	0.0	1.0	0.14	--	--	.8	--	0	30	1.0	0.1	.1	51	27	27	99	4.3	0

## 3-754. LAUREL RUN AT CRELLIN, MD.

Mar. 11, 1964.	F200	5.2	0.4	2.5	0.32	6.0	2.6	0.3	0.5		49	0.3	0.1	0.0	86	25	15	205	3.6	0
Sept. 1, 1964.	F.8	24	--	3.6	1.1	38	16	1.0	1.6		320	.5	.2	.3	488	160	160	3.7	1100	2.9

## 3-825. YOUGHIOGHENY RIVER AT CONNELLSVILLE, PA.

Oct. 15, 1963.	670	3.2		0.02		8.8	2.4	3.0	3.0	12	24	3.6	0.0	2.1	68	32	22	93	6.6	6
Nov. 20, 1963.	960	8.1		.00	0.07	10	2.4	3.4	.3	10	27	4.9	.0	2.3	65	35	27	105	5.9	7
Jan. 29, 1964.	2800	--	--	--	--	--	--	D3.4	--	5	29	5.1	--	3.4	--	36	32	102	5.6	4
Mar. 3, 1964.	3860	--	--	--	--	--	--	D6.9	--	9	33	11	--	1.8	--	44	37	135	6.0	6
Apr. 8, 1964.	8000	--	--	--	--	--	--	D5.8	--	8	27	4.1	--	2.3	--	30	24	92	6.3	2
May 6, 1964.	3360	--	--	--	--	--	--	D5.7	--	7	43	3.8	--	2.1	--	37	32	133	6.1	3
June 17, 1964.	1860	--	--	--	--	--	--	D3.4	--	7	43	3.8	--	3.0	96	51	46	138	6.1	3

D Calculated Na plus K, reported as Na.

F Discharge at time of sampling.

H Estimated.

## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180° C)	Hardness as CaCO <sub>3</sub>		Total acidity as H <sup>+</sup>	Specific conductance (micro-mhos at 25° C)	pH or Col-
																Calcium	Non-carbonate			

## MONONGAHELA RIVER BASIN--Continued

3-850. MONONGAHELA RIVER AT BRADDOCK, PA.

Dec. 9, 1963..	6350							D16		2	108	10		5.1	--	98	97		312	5.1
Mar. 23, 1964.	12000							D13		12	104	8.5		4.6	--	106	96		298	6.0
June 1.....	2310							D36		0	266	13		7.2	468	224	224		675	4.5
July 6.....	2720							D29		2	211	10		7.2	355	178	177		529	4.8
Sept. 14.....	1661							D36		4	221	15		6.3	405	182	179		603	5.1

## MUSKINGUM RIVER BASIN

3-1486. MOXAHALA CREEK NEAR SOUTH ZANESVILLE, OHIO

Oct. 18, 1963.																			2790	3.0
Sept. 18, 1964I				29	18					0	1220	132	1.9	1.2	1860	1040	1040	3.8	2440	3.1

## KANAWHA RIVER BASIN

3-1610. SOUTH FORK NEW RIVER NEAR JEFFERSON, N.C.

Mar. 7, 1964..	F886	6.6		0.03		3.0	1.1	1.4	0.6	10	3.2	2.2	0.1	1.8	J25	12	4		27	6.2
Aug. 20.....	F190	8.6		.05		2.7	1.3	1.8	1.0	17	2.2	.6	.0	.4	J27	12	0		29	6.8

D Calculated Na plus K, reported as Na.

I Discharge at time of sampling, ppm.

J Calculated dissolved oxygen, 8.3 ppm; 88 percent saturation.

J Calculated from determined constituents.





## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific Conductance (micro-mhos at 25°C)	pH	Coliforms per milliliter	Dissolved oxygen	Turbidity
																	Calcium	Noncalcium					
CUMBERLAND RIVER BASIN--Continued																							
3-4014.3. BENNETTS FORK ABOVE STONY FORK NEAR MIDDLESBORO, KY.																							
May 27, 1964.				0.22	0.84					111	246	2.0					298	207		650	6.7	5	280
Sept. 22A....				.19	.14					212	308	4.0					380	206		902	8.1	3	3
3-4014.5. STONY FORK NEAR MOUTH, AT MIDDLESBORO, KY.																							
May 27, 1964.	--			1.4	1.2					50	168	3.0					193	152		441	6.2	15	600
Aug. 26A....	1.17			.22	.43					36	264	6.0					292	262		627	7.3	2	1
Sept. 17A....	.20			.48	.07					46	370	7.0					384	346		801	7.3	3	8
3-4015.2. YELLOW CREEK BYPASS AT MOUTH, AT MIDDLESBORO, KY.																							
May 27, 1964C	--	4.4		0.20	0.44	40	17			54	146	3.0	0.2	0.6			170	126		407	6.5	5	8.3
Aug. 26A....	2.32			.39	.13					90	215	4.0					264	190		588	7.7	3	9
Sept. 18A....	1.37			.46	.64					104	268	14					332	247		738	7.5	3	6
Sept. 22....	--			--	--					--	--	--	--	--	--	--	--	--	--	--	--	--	7.2
3-4020. YELLOW CREEK NEAR MIDDLESBORO, KY.																							
May 27, 1964D	--	4.3		0.97	0.31	48	19			106	148	18	0.2	5.3			198	111		548	6.8	20	5.8
Aug. 26E....	0.64	7.2		2.5	.87	54	23			144	156	92	.5	13			229	111		866	7.2	75	74
Sept. 18F....	.35	10		2.6	.50	56	24	135	9.2	278	135	150	.7	2.1		G662	238	10		1160	7.4	105	55
Sept. 22....	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0
3-4073. HELTON BRANCH AT GREENWOOD, KY.																							
May 25, 1964.	0.13	6.0	0.1	0.11	0.00	2.8	0.3	0.7	0.7	12	2.8	1.0	0.2	0.2			8	0		24	8.9	6	
Aug. 5.....			.1	--	--	--	--	.6	--	10	.4	--	--	--	--	--	9	1	0.0	19	8.6		

A Includes 0.0 ppm detergent (MBAS).

C Includes 0.0 ppm detergent (MBAS) and threshold odor - 0.

D Includes 0.2 ppm detergent (MBAS) and threshold odor - 0.

E Includes 0.2 ppm detergent (MBAS).

F Includes 1.3 ppm detergent (MBAS).

G Calculated from determined constituents.

## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific conductance (micro-mhos at 25°C)	pH	Detergent biol. or (MBAS)
																		Calcium, magnesium, nesium	Non-carbonate			
CUMBERLAND RIVER BASIN--Continued																						
3-4180. ROARING RIVER NEAR HILHAM, TENN.																						
May 26, 1964.	24.4	5.8			0.00	36	5.7	2.0	1.0		126	8.6	4.0	0.0	1.7		128	114	10	229	7.5	4
Sept. 24, 1964.	7.5	6.0			.00	42	6.3	2.8	1.8		154	11	1.9	.0	.0		150	131	5	269	7.7	7
3-4210. COLLINS RIVER NEAR MCINNISVILLE, TENN.																						
Jan. 16, 1964	919	4.1		0.02	0.00	16	3.7	0.9	0.5		56	7.4	3.0	0.1	0.1		68	55	9	117	7.1	5
June 11, 1964.	283	4.2		.08	.00	26	5.4	1.4	.5		96	12	1.8	.1	.1		99	87	8	174	7.6	6
3-4225. CANEY FORK NEAR ROCK ISLAND, TENN.																						
Jan. 15, 1964	3280	3.7		0.08	0.00	11	2.8	0.7	0.6		36	10	3.0	0.0	0.8		52	39	10	90	7.0	4
June 11, 1964.	1280	3.9		.00	.00	32	1.1	.9	.6		90	11	1.2	.0	.0		94	84	10	171	7.7	4
July 6, 1964.	56	4.7		.01	.01	29	5.6	1.1	.7		105	13	1.4	.0	.2		108	96	10	192	7.8	5
3-4268. EAST FORK STONES RIVER AT WOODBURY, TENN.																						
Feb. 6, 1964.	38	5.0			0.00	47	5.7	1.7	0.7		143	15	5.0	0.1	3.3		158	141	24	283	7.8	5
Mar. 3, 1964.	133	5.8			.00	38	6.8	1.3	.6		125	14	3.7	.0	3.0		144	123	20	252	7.6	4
3-4280. WEST FORK STONES RIVER NEAR MURFREESBORO, TENN.																						
Feb. 6, 1964.	239	4.0			0.00	49	4.7	2.1	0.6		207	14	5.5	0.0	0.9		206	192	22	375	7.8	5
Sept. 21, 1964.	1.0	4.4			.00	44	5.6	1.9	1.1		152	8.4	2.0	.0	.2		138	133	8	258	8.0	6
3-4410. DAVIDSON RIVER NEAR BREVARD, N.C.																						
Dec. 6, 1963.	57	7.1		0.01		1.8	0.9	1.1	0.2		7	2.8	1.6	0.2	0.1		A19	8	2	14	6.5	5
June 2, 1964.	102	7.6		.02		1.1	.2	1.1	.3		8	.4	.4	.0	.1		A15	4	0	16	6.7	10
3-4460. MILLS RIVER NEAR MILLS RIVER, N.C.																						
Dec. 9, 1963.	74	6.8		0.02		1.6	0.4	1.3	0.2		7	2.4	0.6	0.2	0.0		A17	6	0	14	6.4	5
June 2, 1964.	150	6.6		.03		1.4	.2	1.0	.4		8	.4	.6	.0	.0		A15	4	0	13	6.8	10

## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> ) num (Al)	Aluminum (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>	Toxicity (micro-mos at 25°C)	pH	Colony or (MBAS)	Determinability	
CUMBERLAND RIVER BASIN--Continued																						
3-4485. HONINY CREEK AT CANDLER, N. C.																						
Dec. 2, 1963.	52	12	0.02		3.2	1.4	2.6	1.5		18	3.8	2.0	0.1	1.7		A37	14	0	46	7.4	5	
June 1, 1964.	80	13	.07		2.9	1.2	2.4	1.2		18	2.2	.6	.0	.9		A33	12	0	37	7.2	15	
3-4500. BEETREE CREEK NEAR SWANNANO, N. C.																						
Dec. 2, 1963.	10	6.3	0.01		2.6	0.9	1.0	0.1		6	4.8	0.6	0.1	0.2		A20	10	5	16	6.6	5	
June 3, 1964.	4.0	8.9	.00		1.6	.1	1.2	.5		8	.6	.4	.0	.1		A17	4	0	17	7.0	5	
3-4510. SWANNANO RIVER AT BILTMORE, N. C.																						
Dec. 9, 1963.	57	12	0.01		4.6	2.3	5.9	1.1		23	7.2	4.0	0.3	2.3		A51	21	2	58	6.5	5	
June 3, 1964.	79	10	.06		3.8	1.1	3.8	1.4		24	3.4	2.6	.0	.1		A39	14	0	55	6.6	10	
3-4530. IVY RIVER NEAR MARSHALL, N. C.																						
Dec. 10, 1963.	68	14	0.04		5.9	2.4	3.5	1.9		24	5.8	4.0	0.1	3.5		A53	25	6	72	6.5	5	
May 14, 1964.	123	12	.04		5.1	1.8	2.9	1.5		26	3.4	1.0	.1	1.0		A42	20	0	56	7.3	18	
3-4540. BIG LAUREL CREEK NEAR STACKHOUSE, N. C.																						
Dec. 10, 1963.	75	10	0.01		4.6	1.3	2.3	0.9		18	3.4	1.0	0.1	1.6		A34	16	2	47	6.7	5	
May 14, 1964.	152	9.8	.00		3.5	1.2	2.0	1.0		20	1.8	.4	.0	.8		A30	14	0	38	7.2	10	
3-4555. WEST FORK PIGEON RIVER ABOVE LAKE LOGAN, NEAR HAZELWOOD, N. C.																						
Dec. 2, 1963.	55	4.8	0.01		1.4	0.2	0.7	0.5		4	0.6	0.8	0.1	1.0		A12	4	1	15	6.0	5	
June 1, 1964.	62	6.4	.00		.6	.4	.8	.4		6	.8	.0	.0	.3		A13	3	0	11	6.9	5	

3-4560. WEST FORK PIGION RIVER BELOW LAKE LOGAN, NEAR WAYNESVILLE, N.C.

Dec. 3, 1963.	69	5.2	0.02	1.1	0.7	0.8	0.7	3	2.8	0.8	0.1	2.0	A15	6	4	20	5.4	5
June 1, 1964.	103	6.6	.02	1.4	.1	1.0	.5	8	.8	.8	.0	.2	A15	4	0	14	6.8	10

3-4565. EAST FORK PIGION RIVER NEAR CANTON, N.C.

Dec. 3, 1963.	79	6.0	0.01	1.0	0.5	0.6	0.7	6	1.4	0.8	0.1	0.9	A15	4	0	16	6.6	5
June 2, 1964.	77	6.6	.01	1.4	.4	1.0	.5	9	.2	.0	.0	.1	A14	5	0	17	7.1	8

3-4575. ALLEN CREEK NEAR HAZELWOOD, N.C.

Dec. 3, 1963.	18	7.1	0.02	1.3	0.7	1.0	0.6	8	0.6	0.6	0.0	0.8	A17	6	0	18	6.7	5
June 2, 1964.	30	7.7	.01	1.4	.3	1.0	.5	10	.6	.6	.0	.1	A17	5	0	16	7.0	8

3-4590. JONATHAN CREEK NEAR COVE CREEK, N.C.

Dec. 4, 1963.	56	9.9	0.03	3.2	1.2	1.8	0.5	13	3.2	0.6	0.2	0.1	A27	13	2	27	6.6	5
June 2, 1964.	120	9.5	.05	1.9	.8	1.7	1.0	12	1.8	.6	.0	1.4	A25	8	0	27	6.4	20

3-4790. WATAUGA RIVER NEAR SUGAR GROVE, N.C.

Dec. 17, 1963	37	9.0	0.02	3.7	1.8	1.9	0.8	15	3.4	3.2	0.1	2.7	A34	16	4	41	7.1	5
May 11, 1964.	111	9.8	.05	4.8	1.6	1.9	.9	23	2.8	.8	.0	.4	A34	18	0	48	7.4	5

3-4875.5. REEDY CREEK AT OREBANK, TENN.

Nov. 20, 1963	5.92	4.8	0.03	0.04	48	22	1.4	1.7	239	12	4.0	0.0	205	211	14	386	8.2	3
May 6, 1964...	27.5	4.4	.00	50	16	1.4	1.6	218	11	1.4	.2	2.2	203	191	12	367	8.1	5
Sept. 17.....	2.0	6.0	.00	43	22	1.0	1.6	229	12	1.5	.0	.7	193	198	10	367	8.1	6

3-4973. LITTLE RIVER ABOVE TOWNSEND, TENN.

Oct. 30, 1963	33.8	7.0	0.00	0.04	2.2	0.2	1.0	0.6	10	1.4	0.8	0.0	19	6	0	21	7.1	5
Mar 15, 1964	3910	3.5	.01	1.0	.3	.4	.3	.4	4	1.6	1.0	.2	12	4	0	14	6.2	8
Sept. 17.....	53	6.3	.00	1.8	.7	.7	.4	.4	9	1.4	.3	.0	16	8	0	19	6.9	2

A Calculated from determined constituents.

## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at H <sup>+</sup> ; 25°C)	pH	Coliform or (MBAS)	Turbidity	
																	Calcium, magnesium	Non-carbonate					
TENNESSEE RIVER BASIN--Continued																							
3-5000. LITTLE TENNESSEE RIVER NEAR PRENTISS, N.C.																							
Nov. 12, 1963	116	9.8		0.03		2.2	0.9	2.1	0.7		13	3.0	0.2	0.0	0.6			A27	9	0	29	6.1	8
June 3, 1964	313	9.2		.00		1.6	.3	1.7	.5		10	.2	1.0	.0	.6			A20	5	0	22	6.0	5
3-5002.4. CARTOOGCHAYE CREEK NEAR FRANKLIN, N.C.																							
Dec. 18, 1963	88	10		0.02		2.4	0.9	1.1	0.7		14	1.6	0.5	0.1	0.9			A25	10	0	28	6.7	5
June 3, 1964	118	11		.00		2.4	.9	1.3	.7		14	1.8	.6	.1	.6			A26	10	0	26	6.3	5
3-5005. CULLASAJA RIVER AT HIGHLANDS, N.C.																							
Dec. 9, 1963	33	4.4		0.04		1.1	0.3	0.5	0.5		5	1.8	0.4	0.1	0.9			A12	4	0	14	5.9	10
May 8, 1964	77	5.0		.03		.6	.3	.7	.3		5	.8	1.2	.0	.5			A11	2	0	11	6.2	5
3-5010. CULLASAJA RIVER AT CULLASAJA, N.C.																							
Nov. 12, 1963	52	8.4		0.06		2.4	0.6	2.6	0.6		12	2.0	1.0	0.1	0.4			A24	8	0	27	6.4	10
June 3, 1964	132	8.4		.01		1.3	.6	1.3	.5		10	1.2	.8	.1	.4			A20	6	0	20	6.0	5
3-5030. LITTLE TENNESSEE RIVER AT NEEDMORE, N.C.																							
Nov. 13, 1963	301	9.3		0.03		2.4	0.6	2.0	0.8		13	1.6	0.2	0.0	0.1			A23	8	0	28	6.3	8
July 2, 1964	556	9.3		.02		1.3	.5	1.7	.7		12	1.0	1.2	.0	.2			A22	5	0	28	6.6	15
3-5040. NANTAHALA RIVER NEAR RAINBOW SPRINGS, N.C.																							
Nov. 15, 1963	54	8.1		0.01		1.4	0.5	1.1	0.4		11	0.0	0.2	0.0	0.0			A17	6	0	18	6.4	6
May 27, 1964	150	7.4		.00		1.3	.4	.8	.3		8	.2	.4	.0	.0			A15	4	0	17	6.1	5
3-5055. NANTAHALA RIVER AT NANTAHALA, N.C.																							
Nov. 14, 1963	631	7.5		0.00		1.8	0.5	1.1	0.5		10	0.8	0.2	0.0	0.1			A18	6	0	18	6.0	5
May 27, 1964	752	5.7		.01		1.6	.2	.7	.4		9	.2	.4	.0	.1			A13	5	0	13	6.8	8

## 3-5080. TUCKASEGEE RIVER AT TUCKASGEE, N.C.

Dec. 4, 1963.	545	6.2		0.06		1.4	0.2	1.7	0.4	9	0.8	0.5	0.0	0.7			17	6.8	8	
June 2, 1964.	308	6.3		.01		1.3	.3	1.3	.5	6	1.2	.6	.1	.6			18	5.8	5	

## 3-5090. SCOTT CREEK ABOVE SYLVA, N.C.

Dec. 4, 1963.	60	11		0.02		3.0	0.9	2.3	0.8	16	3.0	1.1	0.1	0.9			34	6.7	5	
June 2, 1964.	106	11		.29		2.1	1.4	2.2	1.0	15	2.0	1.2	.1	.0			32	6.3	5	

## 3-5120. OCONALUFTEE RIVER AT BIRDTOWN, N.C.

Dec. 2, 1963.	250	7.2		0.00		1.8	0.6	1.7	0.4	8	2.0	0.7	0.1	0.9			22	6.4	5	
July 2, 1964.	205	8.1		.02		.8	.4	1.3	.7	10	.8	1.2	.1	.0			24	6.6	15	

## 3-5135. NOLAND CREEK NEAR BRYSON CITY, N.C.

Dec. 6, 1963.	16	5.3		0.01		1.1	0.2	0.4	0.4	6	0.4	1.0	0.1	0.6			10	6.5	5	
May 19, 1964.	32	6.6		.00		.4	.1	1.0	.6	4	1.0	.5	.1	.4			14	5.8	5	

## 3-5347. CLINCH RIVER TRIBUTARY AT CRM 51.1, AT OAK RIDGE, TENN.

Apr. 17, 1964	2.52	3.6	0.1	0.01	0.00	5.5	2.8	1.0	204	18	3.2	0.2	0.5		203	186	19		350	7.6	5
June 3.....	.14	3.0	.1	.00	.00	65	7.2	1.4	200	23	7.4	.3	.0		217	184	20		380	7.8	6

## 3-5348. EMORY VALLEY CREEK AT OAK RIDGE, TENN.

Oct. 31, 1963	0.02	6.9	0.1	0.03	0.00	69	12	2.9	1.5	0.0	252	10	3.2	0.1	0.1	0.00	220	14		380	8.2	20
Apr. 17.....	.90	5.1	.0	.00	.00	65	5.2	1.4	.8	.0	207	12	2.0	.1	.6	.00	194	184	14	335	7.9	7
June 23.....	.50	6.3	.1	.00	.00	46	9.9	1.5	.9	.0	187	5.4	1.6	.1	.2	.00	186	155	2	348	8.1	5

A Calculated from determined constituents.

## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) at 180°C	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at H <sup>+</sup> 25°C)	pH	Conductance (micro-mhos at 25°C)	Detergent bi-odility (MBAS)	
																	Calcium, magnesium, residue	Non-bicarbonate					
TENNESSEE RIVER BASIN--Continued																							
3-5351. SCARBORO CREEK NEAR OAK RIDGE, TENN.																							
Oct. 31, 1963	0.56	8.1	0.0	0.01	0.00	39	21	1.2	0.8	0.0	205	5.6	1.3	0.0	0.5	0.00	170	178	10	301	7.9	5	0.1
Apr. 17, 1964	4.09	7.0	.1	.01	.00	28	12	.9	.8	.0	140	4.0	1.4	.0	1.1	.00	124	119	4	222	7.6	6	
3-5354. BEAVER CREEK AT SOLWAY, TENN.																							
Apr. 17, 1964	208	5.7	0.0	0.00	0.00	31	7.0	2.0	1.2	0.0	121	7.4	2.5	0.0	3.1	0.00	120	106	8	210	7.3	5	
June 23, 1964	21.8	6.7	.1	.00	.00	34	15	2.8	1.5	.0	176	5.0	2.4	.0	1.5	.10	159	148	4	302	8.2	4	
3-5358. HICKORY CREEK NEAR FARRAGUT, TENN.																							
Oct. 31, 1963	1.05	8.1	0.0	0.02	0.00	45	15	1.7	1.7	0.0	198	11	1.5	0.1	0.2	0.00	179	176	14	310	7.8	10	0.2
Dec. 4, 1963	2.08	6.5	.1	.01	.01	48	11	1.5	1.4	.0	184	13	2.9	.1	.9	.00	179	167	16	309	8.1	5	.0
Apr. 17, 1964	10.4	6.8	.0	.01	.00	34	9.0	1.4	1.4	.0	140	7.8	1.1	.0	1.1	.00	132	121	6	232	7.8	8	--
June 23, 1964	1.78	8.3	.1	.00	.00	35	17	1.2	1.5	.0	186	7.8	1.4	.0	.0	.00	170	159	6	318	8.2	4	--
3-5375. MELTON BRANCH NEAR OAK RIDGE, TENN.																							
Apr. 17, 1964	1.9	5.6	0.0	0.01	0.00	41	5.1	3.3	1.4	0.0	135	19	2.4	0.1	0.5	0.00	144	123	12	246	7.9	7	
June 24, 1964	1.0	4.3	.1	.00	.00	37	9.9	10	1.7	.0	144	21	7.4	.6	5.1	.00	174	132	14	315	8.1	4	
3-5381.1. CLINCH RIVER TRIBUTARY NO. 2 NEAR OAK RIDGE, TENN.																							
Oct. 31, 1963	0.09	7.3	0.0	0.01	0.00	32	15	1.2	0.7	0.0	168	4.4	0.9	0.0	0.1	0.00	141	144	7	249	7.9	5	0.1
Apr. 17, 1964	1.98	6.1	.0	.00	.00	15	4.9	.6	.4	.0	67	4.4	.7	.0	.5	.00	66	56	2	110	7.6	6	
June 23, 1964	.16	7.8	.1	.00	.00	32	13	.8	.6	.0	163	2.2	.4	.0	.1	.00	142	135	2	268	8.0	4	
3-5381.3. CANEY CREEK NEAR KINGSTON, TENN.																							
Oct. 31, 1963	0.94	5.3	0.1	0.01	0.00	48	16	3.6	3.3	0.0	218	6.8	4.3	0.1	0.1	0.00	191	187	8	338	7.5	10	0.1
Apr. 17, 1964	17.4	6.5	.0	.01	.00	23	9.7	1.1	.8	.0	114	4.6	.5	.0	1.3	.00	104	96	3	185	7.3	6	
June 23, 1964	1.63	7.7	.1	.00	.00	31	19	.8	1.1	.0	182	2.8	1.0	.1	.8	.00	157	155	6	301	8.2	5	

## 3-5381.4. GRASSY CREEK NEAR OAK RIDGE, TENN.

Oct. 17, 1964, June 23.....	B0.89 B.53	7.0 10	0.0 .1	0.01 .00	0.00 .00	3.6 30	3.6 9.5	1.7 4.8	1.2 2.0	0.0 .0	68 147	7.8 4.2	0.7 .6	0.0 .2	0.4 .0	0.00 .00	72 138	58 114	3 0	123 242	7.7 8.0	7 4
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## 3-5381.6. POPLAR CREEK AT BATLEY ROAD NEAR OLIVER SPRINGS, TENN.

Oct. 31, 1963 Apr. 17, 1964 June 23.....	B0.68 B80.0 B1.44	8.2 6.2 6.4	0.0 .0 .1	0.02 .00 .00	0.00 .00 .00	33 11 25	9.5 3.5 7.6	3.5 2.8 4.0	2.1 .9 1.4	0.0 .0 .0	103 12 62	37 36 49	2.8 1.3 3.0	0.1 .1 .1	0.1 1.3 .2	0.00 .00 .00	148 73 135	122 42 94	38 32 44	240 109 250	7.5 6.6 7.7	5 5 4
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## 3-5381.8. BRUSHY FORK AT DOSSETT, TENN.

Oct. 31, 1963 Apr. 17, 1964 June 23.....	B1.39 B25.3 B2.19	7.0 6.5 7.2	0.0 .0 .1	0.02 .00 .00	0.00 .00 .00	45 27 40	13 5.2 9.5	2.0 1.3 1.4	1.8 .9 1.1	0.0 .0 .0	188 102 164	9.4 7.6 7.0	1.7 1.3 1.8	0.1 .1 .0	0.2 .9 .7	0.00 .00 .00	180 101 153	166 88 140	12 4 6	294 176 283	7.7 7.4 8.1	10 7 5
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## 3-5382. POPLAR CREEK NEAR OLIVER SPRINGS, TENN.

Apr. 17, 1964 June 23.....	B165 B9.49	6.4 7.1	0.0 .1	0.00 .00	0.00 .00	18 32	4.9 13	2.4 1.6	1.0 .0	0.0 .0	56 152	22 12	2.0 1.4	0.0 .1	1.0 .5	0.00 .00	92 146	65 134	19 10	141 269	7.1 8.0	6 5
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## 3-5382.15. INDIAN CREEK AT OLIVER SPRINGS, TENN.

Oct. 31, 1963 June 23, 1964	B0.22 B.48	12 12	0.1 .1	0.02 .06	0.00 .00	41 26	16 14	30 20	4.9 2.6	0.0 .0	148 56	66 102	28 11	0.2 .1	0.1 .0	5.4 .4	278 224	170 122	48 77	450 369	6.9 7.6	10 6
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## 3-5382.25. POPLAR CREEK NEAR OAK RIDGE, TENN.

Apr. 17, 1964 June 23.....	B5.07 B11.9	7.1 6.1	0.1 .1	0.07 .00	0.00 .00	17 31	5.0 13	2.7 2.8	1.0 1.3	0.0 .0	45 144	30 16	0.9 2.6	0.0 .0	0.3 .3	0.00 .00	94 148	63 132	26 14	141 270	7.1 8.1	7 5
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B Daily mean discharge.



## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN—Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964—Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Total acidity (micro-equivalents at H <sup>+</sup> 25°C)	pH	Color or (MBAS) dity	Detergent (MBAS) dity
																	Calcium-magnesium	Non-bicarbonate				
TENNESSEE RIVER BASIN—Continued																						
3-5382.35. EAST FORK POPLAR CREEK AT BEAR CREEK VALLEY ROAD, AT OAK RIDGE, TENN.																						
Oct. 30, 1963	B12.7	4.2	0.1	0.02	0.0035	8.9	10	1.7	0.0	123	25	6.3	0.8	4.7	0.40	158	124	23	265	7.2	10	
Apr. 17, 1964	B15.0	5.1	0	0.00	0.0036	9.0	25	3.5	0.1	121	44	18	1.4	18	0.10	223	127	28	368	7.3	7	
June 23.....	B13.2	4.5	0.3	0.06	0.0433	8.3	34	2.0	0.2	134	27	27	0.8	18	0.30	222	118	8	403	8.0	5	
3-5382.39. EAST FORK POPLAR CREEK AT EAST VANDERBILT DRIVE, AT OAK RIDGE, TENN.																						
Apr. 17, 1964	B18.9	5.1	0.0	0.00	0.0037	9.5	20	3.3	0.1	123	42	15	1.0	15	0.00	211	132	31	352	7.3	9	
June 23.....	B18.2	4.2	0.3	0.00	0.0033	9.4	31	2.2	0.2	137	28	25	0.7	17	0.20	222	122	10	393	8.1	4	
3-5382.4. TRIBUTARY TO EAST FORK POPLAR CREEK AT OAK RIDGE, TENN.																						
Apr. 17, 1964	B1.86	6.3	0.0	0.00	0.0033	8.8	1.6	0.7	0.0	134	7.6	2.7	0.1	2.9	0.00	130	118	8	226	7.6	6	
June 23.....	B1.11	7.4	0.1	0.00	0.0032	15	38	1.8	0	159	7.0	55	0.1	4.3	0.10	241	142	12	464	8.2	4	
3-5382.42. EAST FORK POPLAR CREEK AT WILTSHIRE DRIVE, AT OAK RIDGE, TENN.																						
Oct. 30, 1963	B13.5	3.6	0.2	0.03	0.0036	9.8	10	1.5	0.0	131	29	6.9	0.6	1.5	0.10	163	131	24	275	7.2	10	0.2
Apr. 17, 1964	B26.4	5.3	0	0.00	0.0040	8.6	15	2.8	0.1	128	36	11	1.0	17	0.00	200	136	32	330	7.3	6	
June 23.....	B15.6	4.2	0.2	0.00	0.0035	9.7	25	2.3	0.2	134	27	23	0.8	16	0.10	222	128	18	398	8.0	4	
3-5382.43. MILL BRANCH AT OAK RIDGE, TENN.																						
Oct. 31, 1963	B0.17	14	0.1	0.02	0.0046	12	5.4	2.8	0.0	181	19	3.5	0.1	0.1	0.00	190	163	14	306	7.7	10	0.1
Apr. 17, 1964	B3.50	7.7	0	0.00	0.0022	3.5	2.2	1.8	0	72	14	2.5	0.1	1.2	0.00	92	68	10	149	7.4	7	
June 23.....	B.33	13	0.1	0.00	0.0050	11	6.1	4.0	0	182	23	6.8	0	3.8	0.00	213	168	18	365	7.8	5	
3-5382.47. GUM HOLLOW BRANCH AT OAK RIDGE, TENN.																						
Oct. 31, 1963	B0.15	10	0.1	0.02	0.0042	8.5	2.5	1.5	0.0	152	15	1.1	0.0	0.1	0.00	158	140	15	258	7.8	15	
Apr. 17, 1964	B4.06	7.6	0	0.00	0.0016	3.0	1.3	1.2	0	56	9.8	0.8	0.2	1.0	0.00	69	52	6	110	7.4	5	
June 23.....	B.55	9.5	0.1	0.00	0.0039	5.8	2.2	1.4	0	134	14	1.4	0.1	1.1	0.00	145	123	13	252	8.1	5	

## 3-5382.50. EAST FORK POPLAR CREEK NEAR OAK RIDGE, TENN.

Apr. 17, 1964	B52	5.7	0.0	0.01	0.01	36	6.8	7.8	2.1	0.1	113	22	6.6	0.5	10	0.60	158	117	24	216	7.2	5
June 23,.....	B22	5.0	.1	.01	.00	38	9.6	17	2.7	.1	131	26	17	.6	12	3.7	203	134	26	351	7.3	5

## 3-5382.6. BEAR CREEK AT COUNTY LINE NEAR OAK RIDGE, TENN.

Apr. 17, 1964	B2.57	6.4	0.1	0.00	0.00	41	9.3	6.9	4.4	1.0	92	31	11	0.7	50	0.10	231	142	67	341	8.0	5
June 24,.....	B.20	6.3	.1	.00	.00	50	20	6.8	2.0	.5	176	31	9.2	.6	39	.00	275	206	62	450	8.1	4

## 3-5382.7. BEAR CREEK AT STATE HIGHWAY 95 NEAR OAK RIDGE, TENN.

Apr. 17, 1964	B9.51	6.5	0.2	0.00	0.00	28	8.3	2.0	1.1	0.1	103	12	2.5	0.2	18	0.00	130	106	21	214	7.5	8
June 24,.....	B1.10	6.7	.1	.00	.00	42	18	2.4	1.1	.0	188	11	2.8	.2	16	.00	202	178	24	360	8.0	3

## 3-5382.75. BEAR CREEK NEAR OAK RIDGE, TENN.

Apr. 17, 1964	B15	6.7	0.0	0.00	0.00	25	7.7	1.9	1.2	0.1	92	14	1.9	0.3	9.2	0.00	117	95	20	193	8.0	7
June 23,.....	B1.2	9.4	.1	.00	.00	43	20	2.8	1.5	.0	177	37	2.4	.2	10	.00	222	190	44	382	8.1	5

## 3-5450. HIWASSEE RIVER AT PRESLEY, GA.

Nov. 15, 1963	36	8.8		0.00			1.2	0.5	0.9	0.3		9	3.0	0.4	0.1	0.2			5	0	18	6.4	5
May 15, 1964.	180	7.6		.00			.8	.2	1.2	.6		7	1.2	1.0	.0	.2		A19	3	0	13	6.9	5

## 3-5470. HIWASSEE RIVER BELOW CHATUGE DAM, NEAR HAYESVILLE, N.C.

Nov. 15, 1963	8.0	3.4		0.00			1.9	0.8	2.6	0.8	11	2.0	1.6	0.1	1.2		A19	8	0	26	6.3	5
May 26, 1964.	1210	4.6		.01			1.4	.8	1.9	1.2	13	.2	1.4	.0	.5		A18	6	0	27	6.5	5

## 3-5485. HIWASSEE RIVER ABOVE MURPHY, N.C.

Nov. 14, 1963	131	8.7		0.02			2.1	1.3	2.7	0.6	14	4.0	1.2	0.1	0.4		A28	10	0	28	6.6	5
May 26, 1964.	459	6.6		.00			1.8	.7	1.2	.6	10	2.0	.4	.0	.4		A19	8	0	23	6.2	5

A Calculated from determined constituents.

B Daily mean discharge.

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued  
 Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> ) num	Alu- mi- num (Al)	Iron (Fe)	Man- ga- nese (Mn)	Cal- cium (Ca)	Mag- ne- sium (Mg)	Sodium (Na)	Po- tas- sium (K)	Lith- ium (Li)	Bi- car- bon- ate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluo- ride (F)	Ni- trate (NO <sub>3</sub> )	Phos- phate (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		To- tal con- duct- ance (micro- mhos at 25°C)	Deter- gent Col- or (MBAS)	Tur- bid- ity
																	Cal- cium, mag- nesium	Non- bon- ate			
TENNESSEE RIVER BASIN--Continued																					
3-5505. NOTTLEY RIVER NEAR BLAIRSVILLE, GA.																					
Nov. 15, 1963	46	10		0.03		1.1	0.9	2.8	0.5		12	2.8	1.4	0.1	0.2		A26	6	0	24	6.6
May 15, 1964	227	8.7		.01		1.0	.5	1.7	.8		9	.8	1.5	.0	.4		A19	4	0	17	6.7
5-5535. NOTTLEY RIVER AT NOTTLEY DAM, NEAR IVYLOG, GA.																					
Nov. 15, 1963	41	6.8		0.00		1.4	0.7	1.5	0.8		12	1.0	0.0	0.0	0.5		A19	6	0	23	6.4
July 13, 1964	1410	7.0		.01		1.7	.5	1.0	.7		10	1.4	.7	.0	.2		A18	6	0	22	6.2
3-5664.2. WOLFTEVER CREEK NEAR OOLTEWAH, TENN.																					
Jan. 10, 1964	B84	5.4		0.00		0.00	17	2.7	1.3		52	12	4.5	0.0	1.3		75	54	11	128	7.0
Apr. 27, 1964	B363	4.7		--		.00	9.8	1.6	1.2		34	6.4	.3	.2	.5		50	31	3	77	6.9
July 7, 1964	B6.5	9.9		.22		.00	47	9.6	5.5		144	46	4.8	.2	.5		200	157	38	337	8.0
3-6035.5 BUFFALO RIVER AT HENRYVILLE, TENN.																					
Nov. 13, 1963	B18.0	3.8		0.03		0.00	11	7.8	0.8		72	1.6	2.5	0.0	0.1		70	60	0	124	7.6
Sept. 9, 1964	B20.9	7.6		.00		.00	18	2.3	.4		66	2.0	1.0	.2	.5		66	54	0	113	7.8
3-6036. BUFFALO RIVER ABOVE RIVERSIDE, TENN.																					
Nov. 14, 1963	B41.9	6.4		0.04		0.00	19	3.5	0.8		74	2.4	2.5	0.0	0.1		72	62	2	126	7.7
May 21, 1964	B122	5.8		.00		.00	12	1.6	1.0		45	1.8	1.0	.1	.1		52	36	0	85	7.2
Sept. 9, 1964	B48.7	7.4		.00		.00	17	2.4	.9		65	2.4	.8	.1	.0		68	52	0	111	7.7
3-6053. TRACE CREEK BELOW GORMAN, TENN.																					
Oct. 22, 1963	0.96	11		0.03		0.00	64	4.9	3.5		191	.25	6.0	.0	0.1		197	180	23	353	8.2
Apr. 21, 1964	7.8	6.3		.00		.00	18	2.2	2.0		61	3.6	3.5	.2	.6		69	54	4	119	7.4

## 3-6055.5. TRACE CREEK NEAR DENVER, TENN.

Oct. 22, 1963	B5.41	7.0		0.03	0.00	36	5.0	3.6	1.3	127	9.0	5.5	0.0	0.2	130	111	6	218	7.6	5
Mar. 25, 1964	B69	4.5			.00	24	3.3	2.5	1.0	74	8.6	4.5	.1	.6	95	74	13	157	7.2	5
Apr. 21.....	B52	4.8			.00	23	2.8	2.5	1.2	73	8.2	4.0	.1	.4	86	69	9	149	7.2	2

## 3-6056. BEAR CREEK NEAR DENVER, TENN.

Oct. 22, 1963	B0.51	5.4		0.03	0.00	27	4.0	1.4	0.6	102	3.0	2.5	0.0	0.1	94	84	0	171	7.9	3
Apr. 22, 1964	B6.0	7.6			.00	6.4	1.4	.9	.6	20	6.8	2.0	.0	.1	36	22	6	53	7.0	0

## 3-6095. TENNESSEE RIVER AT KENTUCKY DAM, NEAR PADUCAH, KY.

Oct. 14, 1963		3.2		0.23						63	11	10			90	62	10	160	6.7	3
Jan. 3, 1964.		4.9		.03						69	16	20			123	74	18	208	7.0	5
Sept. 30.....		8.1		--						54	14	15			97	62	18	169	7.4	10

A Calculated from determined constituents.

B Daily mean discharge.

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1963 to September 1964  
(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)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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	
MIAMI RIVER BASIN														
3-2760. EAST FORK WHITEWATER RIVER AT BROOKVILLE, IND.														
Oct. 27, 1963.....	1335			46	6	0.7								
Mar. 5, 1964.....	1725			1330	687	2470								
ANDERSON RIVER BASIN														
3-3033. MIDDLE FORK ANDERSON RIVER AT BRISTOW, IND.														
Mar. 5, 1964.....	1205			540	155	226								
Mar. 10.....	1830			1040	78	219								
Mar. 12.....	1515			184	60	30								
WABASH RIVER BASIN														
3-3243. SALAMONIE RIVER NEAR WARREN, IND.														
Oct. 26, 1963.....	0830			25	24	1.6								
June 15, 1964.....	1740			60	66	11								
3-3680. BRUSH CREEK NEAR NEBRASKA, IND.														
Mar. 5, 1964.....	2030			18	24	1.2								
July 24.....	1400			.1	48	T								
3-3765. PATOKA RIVER NEAR PRINCETON, IND.														
Nov. 23, 1963.....	1820			14	12	0.4								
Mar. 6, 1964.....	1510			1200	570	1850								
Mar. 11.....	1135			7610	127	2610								
Mar. 12.....	1145			10000	56	1510								
Mar. 13.....	1600			11500	35	2710								
July 23.....	1500			66	17	3.0								

T Less than 0.05 ton.

PART 4. ST. LAWRENCE RIVER BASIN  
STREAMS TRIBUTARY TO LAKE SUPERIOR  
4-160. PARTRIDGE RIVER NEAR AURORA, MINN.

LOCATION.--At gaging station on right bank at upstream side of 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 1964.

Water temperatures: April 1956 to September 1959, July 1960 to September 1963.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180° C)	Hardness as CaCO <sub>3</sub> Calcium magnesium	Non-carbonate	Sodium adsorption ratio	Specific conductance (micro-mhos at 25° C)	Color or pH	
Oct. 3, 1963.	22.2	9.8	--	0.22	0.16	14	8.0	9.6	2.4	60	0	27	6.5	0.3	1.2	0.06	139	68	19	0.5	178	7.2
Oct. 24, .....	29	12	0.2	.56	.03	22	13	17	3.9	93	0	49	13	.4	.6	.07	193	108	32	.7	296	7.6
Nov. 1, .....	24.1	11	.4	.82	.04	17	11	15	3.5	76	0	43	9.7	.3	.9	.08	174	87	25	.7	251	7.4
Nov. 5, .....	11.6	14	.4	.70	.07	25	16	21	4.5	103	0	63	14	.3	7.3	.08	239	128	44	.8	359	7.4
Jan. 9, 1964.	15.5	15	--	--	--	26	17	22	4.8	119	0	51	23	.5	4.5	.08	240	133	35	.8	374	7.7
Feb. 27, .....	10.1	15	--	--	--	25	15	20	3.8	122	0	42	18	.6	2.0	.09	219	126	26	.8	348	7.6
Apr. 1, .....	14.1	12	.5	.48	.03	27	18	28	5.3	138	0	51	25	.8	3.0	.12	245	140	27	1.0	416	7.6
Apr. 22, .....	13.6	10	.4	.35	.03	16	13	17	4.1	98	0	35	11	.4	2.1	.06	168	87	31	.8	268	7.3
May 1, .....	12	9.8	5.9	1.0	.35	10	9.5	17.0	3.6	64	0	32	11	.5	4.1	.07	185	77	24	.7	207	6.9
July 1, .....	97.9	9.8	9.8	1.0	.20	17	8.4	14	3.3	64	0	32	9.8	.5	4.1	.07	185	77	24	.7	207	6.9
Aug. 4, .....	20.0	12	.7	.85	.15	24	16	14	3.3	115	0	41	13	.6	1.3	.17	209	124	30	.5	303	7.1
Sept. 4, .....	54.9	12	.2	.73	.09	24	18	25	7.2	100	0	82	11	.4	13	.07	271	136	54	.9	388	7.3
Sept. 26, ....	106	12	.6	.62	.08	22	21	20	5.5	81	0	93	10	.4	5.6	.07	251	140	74	.7	370	6.6

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued  
4-165. ST. LOUIS RIVER NEAR AURORA, MINN.

LOCATION.--At gaging station on left bank at upstream side of 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 1964.

Chemical analyses, in parts per million, water year October 1963 to September 1964																							
Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Alu- min- um (Al)	Iron (Fe)	Man- gan- ese (Mn)	Cal- cium (Ca)	Mag- ne- sium (Mg)	Sodium (Na)	Po- tas- sium (K)	Bi- car- bonate (HCO <sub>3</sub> )	Car- bonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluo- ride (F)	Ni- trate (NO <sub>3</sub> )	Boron (B)	Disolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Sodium ad- sorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	Cal- or pH	
																			Cal- cium, mag- nesium	Non- car- bon- ate			
Oct. 24, 1963	62	11	0.2	0.49	0.01	16	8.8	9.6	2.3	74	0	25	6.9	0.3	1.2	0.04	134	76	15	0.5	194	7.5	55
Nov. 1.....	50.9	11	0.1	.60	.02	14	7.3	8.4	2.1	64	0	24	5.2	.3	1.7	.05	126	65	12	.5	170	7.5	30
Dec. 6.....	52.5	12	.6	.79	.00	9.8	4.8	3.0	1.5	45	0	7.5	2.1	.1	1.3	.05	91	44	17	.2	102	7.1	85
Jan. 10, 1964	40.2	14	--	--	--	18	8.3	8.3	2.0	78	0	20	7.2	.3	1.4	.06	147	79	15	.4	195	7.6	35
Feb. 20.....	25.5	14	.6	.60	.04	18	8.0	8.2	1.8	80	0	18	7.0	.3	1.0	.03	137	78	12	.4	193	7.5	45
Apr. 1.....	21.3	14	.5	.52	.01	19	7.9	7.8	1.9	87	0	14	6.3	.4	1.8	.06	130	80	9	.4	195	7.4	36
Apr. 22.....	247	6.4	.7	.93	.02	7.3	4.3	3.5	2.1	28	0	16	4.0	.2	3.8	.05	81	36	13	.3	104	6.9	55
May 19.....	438	4.5	.0	.37	.06	7.2	4.4	3.6	2.8	26	0	15	3.2	.3	1.8	.06	94	36	15	.3	87	6.6	120
May 30.....	472	4.1	.0	.51	.07	6.4	3.9	3.1	3.1	24	0	11	3.0	.3	2.2	.02	89	32	12	.2	83	6.5	140
July 11.....	218	6.8	1.3	1.0	.05	7.3	5.5	3.2	1.1	34	0	13	3.4	.2	1.2	.08	112	41	13	.2	87	6.7	200
Aug. 4.....	51	9.7	.8	.96	.05	15	9.1	6.6	2.1	72	0	20	6.8	.3	1.8	.07	145	75	16	.3	173	7.0	100
Sept. 1.....	128	8.8	.1	.83	.06	15	9.6	10	3.1	62	0	35	5.6	.3	4.3	.07	155	77	26	.5	198	7.2	95
Sept. 26.....	296	9.8	.7	.69	.06	18	12	12	3.3	59	0	57	7.0	.3	3.1	.05	177	93	43	.5	242	7.0	50

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 1964.

REMARKS.--Some spectrographic and radiochemical data available in district office at St. Paul, Minn.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Alu- mi- num (Al)	Iron (Fe)	Man- gan- ese (Mn)	Cal- cium (Ca)	Mag- ne- sium (Mg)	Sodium (Na)	Po- tas- sium (K)	Bi- car- bonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluo- ride (F)	Ni- trate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>	Cal- cium, car- bonate as equivalent	Sodium ad- sorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	Col- or or pH		
Oct. 24, 1963	762	7.7	0.6	0.48	0.01	40	5.4	10	1.5	98	0	28	0.4	1.6	0.21	212	122	42	0.4	277	7.8	150	
Oct. 29, .....	652	8.3	1.2	.40	.00	37	10.7	12	1.8	110	0	32	28	1.4	.27	237	134	44	.5	304	7.4	110	
Dec. 6, .....	1220	9.9	1.2	.72	.00	25	7.7	7.8	1.3	79	0	23	13	1.2	.13	177	94	29	.3	217	6.9	120	
Jan. 14, 1964	705	10	..	..	..	..	30	6.8	16	1.4	82	0	28	29	.3	.02	208	103	36	.7	290	6.8	
Feb. 17, .....	614	10	.6	.48	.00	33	6.7	11	1.4	85	0	32	21	1.1	.01	211	110	40	.5	273	7.2	90	
Mar. 30, .....	637	11	.8	.53	.00	34	7.8	11	1.6	93	0	29	22	1.4	1.1	.23	220	117	41	.4	286	7.1	75
Apr. 26, .....	4320	6.3	.0	.34	.08	17	4.8	4.5	1.7	50	0	18	6.8	1.2	.05	128	62	21	.2	142	6.8	110	
May 19, .....	6240	4.4	.8	.48	.03	14	4.9	3.5	1.2	49	0	13	4.0	1.8	.13	126	55	15	.2	116	6.8	180	
May 28, .....	6260	10.5	1.0	.69	.30	43	7.3	4.3	1.7	100	0	12	3.9	2.3	.04	136	106	16	.5	137	6.9	180	
July 8, .....	1750	11	1.0	1.1	.17	40	7.3	13	1.7	151	0	16	11	1.2	.10	227	130	16	.5	293	7.1	100	
July 28, .....	1580	7.7	.8	.57	.14	24	4.9	5.7	1.1	72	0	16	11	1.2	.08	151	80	21	.3	183	6.9	70	
Aug. 25, .....	1240	7.5	.9	.31	.06	20	6.3	6.4	1.1	61	0	19	13	1.3	.18	147	76	26	.3	175	7.0	65	
Sept. 26, .....	2020	9.5	.9	.82	.08	22	8.0	6.0	1.5	66	0	23	12	2.6	.10	179	88	34	.3	178	7.2	170	



STREAMS TRIBUTARY TO LAKE SUPERIOR  
4-310. BLACK RIVER NEAR BESSEMER, MICH.

LOCATION. --Temperature recorder at gaging station on right bank, 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. --200 square miles.  
RECORDS AVAILABLE. --October 1954 to September 1964.  
EXTREMES, 1953-64. --Water temperatures: Maximum, 84° F July 23; minimum, freezing point on many days during winter months.  
REMARKS. --Water temperatures: Maximum, 84° F July 23, 1964; minimum, freezing point on many days during winter months.  
--Complete ice cover during winter months.

Month	Temperature (°F) of water, water year October 1963 to September 1964 (Continuous ethyl alcohol-actuated thermograph)																																	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	57	56	58	60	58	57	55	56	56	53	53	55	57	57	57	57	57	54	53	55	58	60	59	55	52	47	45	44	44	55		
Maximum ....	58	58	57	56	58	60	58	57	55	56	56	53	53	55	57	57	57	57	57	54	53	55	58	60	59	55	52	47	45	44	44	55		
Minimum ....	58	55	51	49	53	57	56	53	50	52	51	48	48	50	51	53	55	54	53	53	53	53	54	57	55	52	47	45	44	42	42	51		
November	42	41	39	38	38	40	42	41	41	41	38	34	32	32	32	34	35	35	35	34	34	37	37	33	32	32	32	32	32	32	32	32	36	
Maximum ....	42	41	39	38	38	40	42	41	41	41	38	34	32	32	32	34	35	35	35	34	34	37	37	33	32	32	32	32	32	32	32	32	36	
Minimum ....	39	39	36	37	37	38	40	40	41	38	34	32	32	32	32	34	35	34	34	34	34	35	33	32	32	32	32	32	32	32	32	32	35	
December	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	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	32	
January	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	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	32	
February	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	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	32	
March	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	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	32	
April	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	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	32	
May	51	51	58	61	61	62	61	60	58	57	57	55	57	55	57	58	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	61
Maximum ....	51	51	58	61	61	62	61	60	58	57	57	55	57	55	57	58	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	
Minimum ....	50	50	50	56	57	58	57	57	55	55	55	52	50	51	56	55	57	58	58	58	58	58	60	59	60	61	62	64	62	61	61	62	60	
June	59	57	58	61	63	66	68	69	70	64	61	67	68	64	62	62	66	66	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	
Maximum ....	59	57	58	61	63	66	68	69	70	64	61	67	68	64	62	62	66	66	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	
Minimum ....	54	53	52	54	55	60	61	62	62	58	57	58	55	58	57	58	62	61	62	61	61	61	62	58	61	68	70	79	80	81	82	82	82	82
July	76	79	72	75	75	74	80	74	76	74	78	76	71	74	77	81	79	83	83	81	82	82	84	80	79	80	80	73	74	74	73	77	77	
Maximum ....	76	79	72	75	75	74	80	74	76	74	78	76	71	74	77	81	79	83	83	81	82	82	84	80	79	80	80	73	74	74	73	77	77	
Minimum ....	72	69	66	62	65	65	67	69	65	68	66	64	64	68	71	72	73	70	69	71	73	67	67	67	67	67	67	67	67	67	67	67	67	
August	66	58	74	68	66	67	65	60	55	59	60	57	54	55	56	60	58	60	58	57	56	57	56	55	55	55	55	58	62	61	62	60	60	
Maximum ....	66	58	74	68	66	67	65	60	55	59	60	57	54	55	56	60	58	60	58	57	56	57	56	55	55	55	55	58	62	61	62	60	60	
Minimum ....	63	65	69	66	62	63	61	61	63	61	55	55	56	52	50	56	58	58	58	56	57	56	54	51	52	51	52	51	47	48	47	47	57	
September	57	59	64	59	56	58	60	60	61	61	55	52	52	52	48	49	50	56	58	56	55	54	54	51	48	46	45	45	46	44	44	44	54	
Maximum ....	57	59	64	59	56	58	60	60	61	61	55	52	52	52	48	49	50	56	58	56	55	54	54	51	48	46	45	45	46	44	44	44	54	
Minimum ....	57	59	64	59	56	58	60	60	61	61	55	52	52	52	48	49	50	56	58	56	55	54	54	51	48	46	45	45	46	44	44	44	54	

STREAMS TRIBUTARY TO LAKE MICHIGAN  
4-460. BLACK RIVER NEAR GARNET, MICH.

LOCATION.--Temperature recorder at gaging station on right bank, 10 feet upstream from highway 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, approximately.

RECORDS AVAILABLE. ---Water temperatures: October 1951 to September 1964.

**EXTREMES, 1963-64.**--Water temperatures: Maximum, 65°F July 21, minimum, 33°F Dec. 14-19.

EXTREMES, 1951-64.--Water temperatures: Maximum, 68°F July 21, 22, 1952; minimum, freezing point on many days during winter 1951-52. --Water temperatures: Maximum, 68°F July 21, 22, 1952; minimum, freezing point on many days during winter 1951-52.

months.

[illegible]

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	48	49	48	45	47	48	46	47	47	47	48	48	46	47	47	47	48	48	48	49	49	49	50	49	49	49	48	45	44	42	41	47
	Maximum	44	47	45	44	45	46	45	45	45	46	45	44	45	44	46	47	47	48	48	49	49	48	48	49	47	47	45	44	42	41	46
November	41	41	41	43	44	45	44	44	44	44	43	43	43	42	42	43	43	42	41	42	45	44	40	38	36	37	37	37	37	37	—	42
	Maximum	41	41	40	41	43	44	44	43	43	43	43	43	42	41	42	42	41	42	41	40	41	42	40	38	36	37	37	37	34	—	41
December	34	34	34	34	34	35	36	34	34	34	34	34	34	33	33	33	33	33	34	34	34	34	34	34	34	34	34	34	35	35	34	
	Maximum	34	34	34	34	34	34	34	35	34	34	34	34	34	33	33	33	33	34	34	34	34	34	34	34	34	34	34	34	35	34	
January	35	36	36	36	36	36	36	37	37	37	36	36	35	35	36	36	36	36	36	37	37	37	37	37	37	37	36	36	36	36	36	
	Maximum	35	35	36	36	36	36	36	37	37	36	35	35	35	36	36	36	36	36	37	37	37	37	37	37	37	36	36	36	36	36	
February	36	36	36	36	37	37	37	37	37	37	37	37	37	36	36	36	36	36	36	36	36	37	37	37	37	36	36	36	36	36	36	
	Maximum	36	36	36	36	37	37	37	37	37	37	37	37	36	36	36	36	36	36	36	36	37	37	37	37	35	35	35	35	36	—	36
March	38	38	38	37	37	35	36	36	37	36	36	36	37	37	37	36	35	35	34	35	34	35	37	37	37	37	34	36	34	34	36	36
	Maximum	37	37	37	37	37	35	35	35	36	35	36	36	37	37	36	35	34	34	34	34	35	35	37	35	34	34	34	34	34	34	35
April	36	37	36	37	37	36	36	34	35	37	37	35	36	38	40	40	39	40	39	40	39	39	39	39	41	44	47	48	48	49	49	40
	Maximum	36	36	34	34	36	36	34	35	35	35	35	35	35	38	40	39	37	39	39	39	39	39	39	39	41	44	47	48	48	49	38
May	49	50	54	55	57	59	58	56	55	56	58	57	55	54	56	58	57	56	55	52	54	56	56	58	57	55	53	54	52	54	55	55
	Maximum	48	49	51	54	54	57	56	54	52	54	55	52	51	52	53	52	51	52	50	49	50	53	55	53	54	51	50	48	48	49	52
June	54	53	52	54	57	58	59	58	54	51	59	58	57	56	52	52	52	52	50	49	50	50	51	52	51	51	51	52	52	53	52	53
	Maximum	49	48	48	48	51	53	52	53	50	50	50	52	53	52	50	51	52	54	54	55	55	54	55	57	55	55	56	57	58	—	57
July	62	60	60	60	60	58	61	62	62	61	59	57	57	60	62	60	58	64	65	63	62	61	64	62	60	59	60	57	58	61	58	61
	Maximum	57	58	57	54	54	55	55	56	56	55	55	55	54	55	58	57	58	59	60	57	57	58	60	58	57	57	57	57	57	57	56
August	57	58	59	63	61	59	59	58	55	55	57	55	56	56	56	55	55	55	55	53	53	54	54	55	55	55	58	59	60	59	57	57
	Maximum	56	56	58	57	55	57	55	52	53	55	54	52	52	52	55	54	53	53	53	53	53	53	53	54	53	53	55	56	56	54	54
September	56	58	56	57	54	56	56	56	52	53	50	49	53	53	53	53	53	53	52	53	52	53	52	53	52	51	51	49	47	47	—	51
	Maximum	53	54	55	56	51	54	55	55	52	50	50	50	49	49	49	49	49	51	52	51	51	52	52	52	51	49	47	47	—	51	51

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued  
4-579. BLACK RIVER NEAR REPUBLIC, MICH.

LOCATION.--At gaging station on left bank at bridge on county highway, 2.2 miles downstream from Bruce Creek, and 4.4 miles east of Republic, Marquette County.  
DRAINAGE AREA.--34.4 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1961 to September 1964.

Sediment records: April 1962 to September 1963, October 1963 to September 1964 (periodic).

EXTREMES, 1963-64.--Water temperatures: Maximum, 79° F July 21; minimum, freezing point on many days during winter months.

REMARKS.--Water temperatures: Maximum, 81° F July 1, 1963; minimum, freezing point on many days during winter months.

REMARKS.--Complete ice cover during winter months.

Temperature (°F) of water, water year October 1963 to September 1964

(Continuous ethyl alcohol-actuated thermometer)

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

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued  
4-579. BLACK RIVER NEAR REPUBLIC, MICH.--Continued

Periodic determinations of suspended-sediment discharge, water year October 1963 to September 1964  
(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)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (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
Oct. 10, 1963.....	1145			2.3	3	T												
Dec. 2.....	1215			7.8	6	0.1												
Dec. 30.....	1145			4.0	11	.1												
Jan. 29, 1964.....	1400			4.3	4	T												
Feb. 28.....	1245			4.8	6	.1												
Apr. 15.....	1715			167	13	5.9												
Apr. 22.....	1515			123	4	1.3												
May 6.....	0940			91	2	.5												
June 2.....	1400			27	8	.6												
July 6.....	1430			2.2	2	T												
Aug. 3.....	1535			56	5	.8												

T Less than 0.05 ton.

4-580. MIDDLE BRANCH ESCANABA RIVER NEAR ISHPENING, MICH.

LOCATION.--Temperature recorder at gaging station on left bank, 0.5 mile downstream from County Highway 581, 6 miles southwest of Ishpeming, Marquette County, and 10 miles east of Republic.

DRAINAGE AREA.--88 square miles.

RECORDS AVAILABLE.--August 1961 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 78°F July 21, minimum, freezing point on many days during winter months.

EXTREMES, 1961-64.--Water temperatures: Maximum, 78°F July 1, 2, 1963, July 21, 1964; minimum, freezing point on many days during winter months.

REMARKS.--Complete ice cover during winter months.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (residue at 180°C)	Dis-solved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>	Total acidity (micro-mhos at 25°C)	Specific conductance (micro-mhos at 25°C)	Color or turbidity	Loss on ignition	
July 22, 1964	A19				14	3.9	3.6	0.9		60		7.0	0.0					79	51	2	118	7.6	32

A Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued  
 4-580. MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MICH.--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964  
 (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	54	54	54	51	54	54	54	53	51	50	51	51	51	49	49	51	51	51	52	52	52	53	53	53	54	55	54	50	46	45	44	43	
Maximum ....	54	54	54	51	54	54	54	53	51	50	51	51	51	49	49	51	51	51	52	52	52	53	53	53	54	55	54	50	46	45	44	43	
Minimum ....	54	53	51	47	52	53	53	50	48	48	50	47	46	46	47	48	50	50	51	52	51	51	52	53	54	50	46	43	44	43	42	49	
November	42	40	38	38	38	39	41	42	42	42	42	42	42	40	39	39	40	40	40	38	39	42	42	38	35	34	34	34	33	33	33	39	
Maximum ....	40	38	38	38	38	39	41	42	42	42	42	42	40	39	39	39	40	40	38	39	42	42	38	35	34	34	34	33	33	33	32	38	
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	
December	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	
March	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
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	
May	49	49	51	56	58	60	62	62	61	56	56	55	54	55	57	59	60	60	57	57	60	67	68	67	63	61	61	58	58	58	57	58	
Maximum ....	48	48	49	54	55	58	59	60	56	54	54	54	51	51	54	55	56	55	52	54	59	65	63	60	60	58	55	54	54	54	54	55	
Minimum ....	47	56	57	61	62	63	66	68	66	64	61	62	63	63	64	63	60	66	66	66	66	68	67	69	72	73	75	76	76	76	76	76	76
June	52	51	52	51	52	58	60	60	64	60	58	58	61	56	58	61	56	62	62	62	62	64	67	68	67	69	72	73	75	76	76	76	76
Maximum ....	52	51	52	51	52	58	60	60	64	60	58	58	61	56	58	61	56	62	62	62	62	64	67	68	67	69	72	73	75	76	76	76	76
Minimum ....	74	72	71	69	69	70	72	73	72	72	68	64	66	70	74	74	74	76	78	77	74	73	73	67	67	66	64	65	64	65	64	65	70
July	70	67	65	62	62	65	66	68	66	67	63	61	60	62	66	72	70	72	70	72	68	66	67	66	64	63	63	60	60	60	60	60	66
Maximum ....	68	72	74	73	71	70	68	64	60	61	62	61	59	59	58	62	62	60	58	62	61	57	57	57	57	56	57	60	62	64	65	65	63
Minimum ....	64	68	71	70	66	66	64	60	56	58	61	58	56	55	55	58	56	54	56	57	56	54	56	55	56	55	56	59	60	62	61	59	59
August	61	60	62	62	59	58	58	58	58	60	56	54	54	52	51	54	55	55	55	55	55	56	56	55	54	52	52	49	47	47	47	47	56
September	56	58	58	59	56	54	57	57	58	56	52	50	52	52	49	48	49	53	55	55	55	55	55	55	54	52	52	49	47	46	47	46	53
Maximum ....	56	58	58	59	56	54	57	57	58	56	52	50	52	49	48	49	53	55	55	55	55	55	55	55	54	52	52	49	47	46	47	46	53
Minimum ....	56	58	58	59	56	54	57	57	58	56	52	50	52	49	48	49	53	55	55	55	55	55	55	55	54	52	52	49	47	46	47	46	53





STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued  
 4-585. EAST BRANCH ESCANABA RIVER AT GWINN, MICH.--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964  
 (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	54	54	54	51	54	55	55	53	53	52	52	51	50	51	51	52	53	53	53	52	53	54	55	55	55	53	50	47	45	43	42	52		
Maximum ....	49	52	51	47	49	51	52	49	48	48	50	47	46	47	48	48	50	51	52	52	51	51	51	53	53	50	47	45	43	42	41	49		
Minimum ....	41	40	39	38	38	39	40	42	42	42	41	40	38	38	38	37	38	38	37	37	40	40	37	34	33	33	33	33	33	33	33	38		
November	40	39	37	37	37	38	39	40	42	41	40	38	38	38	37	36	36	38	37	36	37	37	37	34	33	33	33	33	33	32	--	37		
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		
December	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32		
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	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32		
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	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32		
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		
March	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32		
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	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32		
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		
May	47	46	49	53	55	58	60	60	59	56	56	56	54	55	56	59	60	59	57	58	57	58	65	67	63	62	61	59	57	57	57	58		
Maximum ....	46	46	46	49	52	53	57	58	55	53	54	54	51	51	54	53	55	56	55	51	53	57	63	63	59	60	58	55	52	53	54	54		
Minimum ....	57	55	56	57	60	62	64	65	68	65	62	60	61	63	63	61	59	66	66	66	64	66	65	67	70	72	74	76	74	--	--	64		
June	52	51	50	51	53	57	59	59	62	62	57	58	58	60	56	57	56	59	61	61	61	62	60	60	64	64	67	69	71	--	--	59		
Maximum ....	73	74	72	68	69	67	66	73	73	73	72	67	64	64	67	72	75	75	76	77	76	76	75	72	70	68	67	67	65	65	71			
Minimum ....	68	68	64	61	62	63	64	65	65	65	66	63	59	58	59	68	68	68	69	71	68	68	69	70	67	66	65	64	60	60	65			
July	67	71	73	72	70	67	66	62	58	58	60	59	58	58	58	59	59	60	59	60	59	56	56	55	55	57	60	62	65	66	65	62		
Maximum ....	63	66	68	67	65	64	62	58	54	56	58	56	54	54	53	56	55	54	55	56	56	55	54	55	54	55	56	60	61	63	65	56		
Minimum ....	61	61	63	62	61	60	59	60	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
August	56	49	61	60	57	56	58	58	58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Maximum ....	56	49	61	60	57	56	58	58	58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Minimum ....	56	49	61	60	57	56	58	58	58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		





STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

LOCATION.--Temperature recorder at gaging station on left bank, 10 feet downstream from bridge on county highway, 0.6 miles downstream from West Branch, and 3.5 miles northwest of Champlon, Marquette County.

**DRAINAGE AREA.** --133 square miles.

RECORDS AVAILABLE.--Water temperatures: August 1961 to September 1962, October 1963 to September 1964.

EXREMES, 1963-64.--Water temperatures: Maximum, 81°F June 29, 30; minimum, freezing point on many days during winter months.  
EXREMES, 1961-62, 1963-64.--Water temperatures: Maximum, 81°F June 29, 30, 1964; minimum, freezing point on many days during

winter months.

Temperature (°F) of water, water year October 1963 to September 1964 (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	58	58	56	54	58	60	58	56	55	53	56	53	55	53	57	57	57	56	56	54	56	58	58	58	54	58	54	48	46	45	43	42
	Minimum	50	54	51	47	52	54	56	49	47	49	53	47	45	49	49	51	54	53	55	53	52	52	52	56	54	48	44	43	43	42	40	
	Average	54	56	53	55	56	57	58	57	57	57	57	57	56	57	57	57	57	57	57	56	56	57	57	57	56	55	54	52	51	50	49	50
November	Maximum	47	37	39	37	39	41	42	41	41	39	37	35	35	37	35	35	37	36	35	36	39	39	33	33	33	33	33	33	32	32	32	32
	Minimum	32	36	35	34	38	41	41	41	40	39	37	35	35	37	35	35	37	36	35	36	36	36	33	33	33	33	33	32	32	32	32	32
	Average	42	37	39	38	40	41	41	41	40	39	37	35	35	37	35	35	37	36	35	36	37	37	36	36	36	36	36	36	36	36	36	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
	Average	32	32	32	32	32	32	32	32	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
	Average	32	32	32	32	32	32	32	32	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	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
	Average	32	32	32	32	32	32	32	32	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
	Average	32	32	32	32	32	32	32	32	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	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
	Average	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
May	Maximum	50	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
	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
	Average	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
June	Maximum	50	50	54	57	57	56	58	54	51	52	52	51	51	55	55	56	57	55	52	55	60	63	60	58	60	58	56	54	54	55	55	55
	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
	Average	42	42	43	44	44	44	45	42	41	41	41	41	41	43	43	44	44	43	43	43	46	49	46	49	48	48	47	47	47	47	47	47
July	Maximum	58	56	58	58	62	64	66	72	65	61	62	63	64	63	65	63	62	68	68	69	70	69	72	76	77	74	70	68	67	68	68	67
	Minimum	53	53	53	53	55	56	62	62	65	61	58	59	62	61	62	59	60	62	60	64	65	67	63	62	65	67	71	70	71	71	71	71
	Average	56	54	56	56	59	60	64	67	64	64	60	61	62	62	62	61	61	65	64	66	67	68	70	72	71	70	69	69	69	69	69	69
August	Maximum	78	78	74	74	75	73	74	73	74	75	73	68	66	69	72	76	76	79	77	79	78	78	76	68	68	67	67	66	65	65	65	65
	Minimum	71	71	67	64	64	67	66	68	66	67	64	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
	Average	74	74	70	70	70	70	70	70	70	70	70	69	69	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
September	Maximum	65	70	69	68	67	67	64	61	56	61	62	58	56	55	56	60	57	55	57	59	58	58	56	56	57	52	51	62	61	62	60	60
	Minimum	53	62	61	61	61	61	60	60	61	62	61	57	56	56	53	51	56	60	59	57	57	57	57	57	57	57	57	57	57	57	57	57
	Average	59	66	65	64	64	64	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63



STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued  
4-555. STURGEON RIVER NEAR FOSTER CITY, MICH.

LOCATION.--Temperature recorder at gaging station on left bank, 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.--237 square miles.  
RECORDS AVAILABLE.--Water temperatures: July 1956 to September 1964.  
EXTREMES, 1963-64.--Water temperatures: Maximum, 84°F July 21; minimum, freezing point on many days during winter months.  
EXTREMES, 1966-64.--Water temperatures: Maximum, 86°F July 1, 1963; minimum, freezing point on many days during winter months.  
REMARKS.--Complete ice cover during winter months.

Temperature (°F) of water, water year October 1963 to September 1964  
(Continuous ethyl alcohol-actuated thermometer)

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



## STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-1130. GRAND RIVER AT LANSING, MICH.

LOCATION---Temperature recorder at gaging station on right bank 30 feet upstream from bridge on North Grand River Avenue in Lansing, Ingham County, 2 miles downstream from Cedar River, and at mile 152.  
 DRAINAGE AREA---1,230 square miles, approximately.  
 RECORDS AVAILABLE---Water temperatures: October 1963 to September 1964.  
 RECENT RECORDS, 1964---Water temperatures: Maximum, 104°F, July 25; minimum 41°F Dec. 8.  
 REMARKS---No temperature records Oct. 1-9, no range available.

Temperature (°F) of water, water year October 1963 to September 1964  
 (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																																
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## STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

## 4-1215. MUSKOGON RIVER AT EVART, MICH.

LOCATION.--Temperature recorder at gaging station on right bank, 500 feet downstream from bridge on U.S. Highway 10 at Evart, Osceola County, and 0.4 mile upstream from Twin Creek.  
 DRAINAGE AREA.--1,450 square miles.  
 RECORDS AVAILABLE.--Water temperatures: November 1956 to September 1964.  
 RECORDS EXTENDING TO 1964.--Maximum, 81°F; June 26; minimum, 31°F; June 26; freezing point on many days during December to March.  
 EXTREMES, 1956-64.--Water temperatures: Maximum, 82°F July 1, 1963; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964 (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	58.60	59.57	56.59	58.57	57.58	59.58	56.54	54.55	57.57	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58	57.58
	Minimum	53.55	56.52	51.53	56.55	53.53	55.54	52.49	49.51	53.54	55.56	56.55	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56	55.56
November	Maximum	65.44	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43	63.43
	Minimum	44.42	41.41	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43	43.43
December	Maximum	36.34	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33
	Minimum	34.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33
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	32.32	32.32	32.32	32.32	32.32	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	32.32	32.32	32.32	32.32	32.32	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	32.32	32.32	32.32	32.32	32.32	32.32	32.32	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	32.32	32.32	32.32	32.32	32.32	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	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	32.32	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	32.32	32.32	32.32	32.32	32.32	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	39.38	41.41	40.42	43.43	41.43	44.47	49.49	49.52	56.56	53.50	51.50	49.51	53.54	54.55	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53	55.53
	Minimum	35.37	38.37	38.40	42.40	39.40	42.44	47.47	46.47	51.52	50.48	48.47	49.51	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53
May	Maximum	52.56	59.61	64.66	68.68	67.62	62.62	62.60	61.62	63.64	68.66	65.68	71.70	69.68	66.66	63.62	60.64	64.66	61.62	68.68	64.66	61.62	68.68	64.66	61.62	68.68	64.66	61.62	68.68	64.66	61.62	68.68	64.66	61.62
	Minimum	51.52	56.58	61.63	64.66	60.59	59.60	58.55	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63	57.60	53.63
June	Maximum	61.60	59.63	65.67	72.75	74.74	69.68	73.75	74.74	69.68	73.75	74.74	69.68	73.75	74.74	69.68	73.75	74.74	69.68	73.75	74.74	69.68	73.75	74.74	69.68	73.75	74.74	69.68	73.75	74.74	69.68	73.75	74.74	69.68
	Minimum	54.55	54.55	57.60	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68	63.64	68.68
July	Maximum	79.79	78.75	75.73	71.68	72.75	74.72	67.63	66.71	75.76	78.77	77.78	78.79	78.77	76.79	77.74	71.74	74.74	75.76	78.77	77.78	78.79	78.77	76.79	77.74	71.74	74.74	75.76	78.77	77.78	78.79	78.77	76.79	
	Minimum	74.73	73.68	66.68	68.67	65.67	69.67	63.62	60.65	69.67	72.73	71.73	74.74	75.76	78.77	77.78	78.79	78.77	76.79	77.74	71.74	74.74	75.76	78.77	77.78	78.79	78.77	76.79	77.74	71.74	74.74	75.76	78.77	
August	Maximum	71.78	70.79	77.74	75.72	57.55	57.55	52.54	64.64	68.66	66.64	63.66	66.66	63.66	67.67	70.72	69.69	63.66	60.64	62.65	64.64	63.66	67.67	70.72	69.69	63.66	60.64	62.65	64.64	63.66	67.67	70.72	69.69	
	Minimum	66.68	74.74	71.69	68.64	60.62	63.61	58.57	58.59	61.61	59.61	60.59	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	63.60	
September	Maximum	67.65	69.72	68.65	67.68	68.68	67.61	60.58	57.55	60.59	56.56	64.64	63.65	57.56	56.56	59.63	59.63	57.56	56.56	59.63	59.63	57.56	56.56	59.63	59.63	57.56	56.56	59.63	59.63	57.56	56.56	59.63	59.63	
	Minimum	61.61	61.66	63.60	61.64	66.65	61.66	60.58	57.55	60.59	56.56	64.64	63.65	57.56	56.56	59.63	59.63	57.56	56.56	59.63	59.63	57.56	56.56	59.63	59.63	57.56	56.56	59.63	59.63	57.56	56.56	59.63	59.63	



## STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-1235. MANISTEE RIVER NEAR GRAYLING, MICH.

LOCATION.--Temperature recorder at gaging station on right bank, 25 feet upstream from bridge on State Highway 72, 2.5 miles downstream from Lake Michigan and 6.5 miles northwest of Grayling, Crawford County.

DRAINAGE AREA--159 square miles.

RECORDS AVAILABLE.--Water temperatures: May 1957 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 74° June 30; minimum, freezing point on many days during December to February.

EXTREMES, 1957-64.--Water temperatures: Maximum, 76° July 1, 1963; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964  
(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	56	58	57	52	54	56	56	54	53	54	56	55	53	--	--	--	52	53	53	52	53	54	55	55	52	54	54	48	44	43	43	52	
	49	52	52	47	50	51	49	47	48	52	50	46	--	--	--	49	51	52	52	51	51	52	52	51	51	48	44	42	41	41	49		
November	43	42	43	44	45	44	44	44	44	45	45	42	41	41	40	43	44	44	42	42	44	45	39	38	38	40	40	36	--	--	42	40	
	42	41	40	41	43	44	43	42	43	44	42	40	40	40	40	42	42	41	40	40	42	39	38	36	36	37	38	36	34	--	40		
December	34	33	33	33	33	33	35	37	34	33	33	33	33	33	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	35	37	34	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	
January	32	32	32	34	34	34	34	34	34	34	32	32	32	32	32	32	32	32	32	34	35	36	38	38	36	33	32	32	34	33	33	33	
	32	32	32	32	33	33	34	33	34	32	32	32	32	32	32	32	32	32	32	34	35	36	38	38	36	33	32	32	32	32	33	33	
February	35	36	32	36	36	36	36	36	32	32	32	32	32	32	32	32	32	32	32	32	32	34	36	36	33	34	34	37	--	35	35	35	
	34	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	36	36	33	34	34	34	34	34	34	33	
March	38	41	41	41	40	36	40	39	38	39	39	40	41	42	42	41	41	39	40	40	42	43	44	45	44	45	44	40	40	41	41	41	41
	37	37	41	40	35	34	36	36	36	36	38	38	41	38	37	36	36	38	39	38	39	41	41	41	41	36	36	39	37	37	38	38	
April	42	42	43	44	44	46	46	46	46	49	49	53	53	50	49	54	60	59	53	52	49	48	48	48	56	57	54	55	53	--	50	50	
	37	41	40	38	41	44	45	44	45	48	50	46	47	52	49	48	47	52	49	48	49	46	46	49	50	53	52	53	53	--	46	46	
May	55	60	62	63	66	65	68	66	63	60	60	60	59	58	53	56	63	62	67	63	62	67	67	67	67	63	62	58	57	58	58	62	
	52	53	55	56	58	61	61	62	56	54	54	54	54	50	53	56	56	55	55	55	54	58	62	63	55	57	53	51	50	52	52	56	
June	58	58	56	59	62	63	63	65	69	69	61	60	67	67	67	60	59	60	71	69	70	72	69	64	72	71	71	73	74	--	67	67	
	51	52	50	50	52	55	58	56	62	59	54	56	59	57	50	53	53	60	64	62	62	65	56	52	60	64	62	64	66	--	57	57	
July	72	67	69	68	67	67	68	68	69	65	60	59	66	70	73	72	73	72	72	72	72	72	72	72	72	70	72	72	66	64	69	69	
	66	62	63	60	58	60	61	61	60	62	60	58	58	61	66	66	65	64	66	64	65	64	64	67	62	63	65	68	65	62	63	62	
August	64	71	71	71	69	67	68	66	57	58	60	60	56	59	59	59	62	61	59	61	61	62	62	60	61	60	61	61	63	65	65	63	
	60	60	68	64	62	60	62	57	52	56	57	55	52	52	54	56	55	55	55	54	57	53	58	54	53	59	57	59	59	57	57	57	
September	62	62	65	65	64	59	59	60	61	61	60	56	54	52	52	57	57	54	55	58	58	57	54	52	52	52	51	50	50	50	50	50	
	56	57	60	62	58	53	56	58	60	55	50	49	51	47	48	50	53	54	54	55	57	54	52	51	50	51	50	47	46	47	--	53	

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

LOCATION.--Temperature recorder at gaging station on right bank, 25 feet upstream from Simile Bridge, 5.8 miles north of Freosoll, Mason County, 7.4 miles upstream from mouth, and 9 miles southeast of Manistee.

DRAINAGE AREA.--200 square miles.

RECORDS AVAILABLE.--Water temperatures: Maximum, 71°F June 30, Aug. 3; minimum, 33°F on many days during December to March. EXTREMES, 1963-64.--Water temperatures: Maximum, 70°F June 17, 18, 1957; minimum, freezing point Dec. 10-16, 1957. EXTREMES, 1956-64.--Water temperatures: Maximum, 70°F June 17, 18, 1957; minimum, freezing point Dec. 10-16, 1957.

Temperature (°F) of water, water year October 1963 to September 1964 (Continuous ethyl alcohol-actuated thermograph)																																		
		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	55	54	53	52	52	54	53	52	52	53	54	53	53	52	52	53	55	54	56	56	56	57	56	55	56	54	50	48	46	46	53		
	Minimum	50	52	51	50	49	51	51	50	49	51	52	51	50	50	50	51	51	53	53	53	54	53	53	54	53	50	47	46	44	46	51		
	Average	52	53	52	51	50	52	52	51	51	51	51	51	51	51	51	51	52	54	54	54	55	55	56	55	54	52	49	47	46	45	52		
November	Maximum	46	45	45	46	47	47	47	47	46	48	46	45	44	44	44	46	49	49	45	46	49	44	44	44	44	42	43	44	44	42	40	46	
	Minimum	45	44	42	44	46	47	45	44	44	46	45	44	44	44	44	44	44	46	45	44	44	46	44	44	40	40	41	43	42	39	--	44	
	Average	45	44	43	45	46	47	46	45	46	46	46	45	44	44	44	45	46	47	45	45	46	45	45	44	42	41	42	43	43	41	--	44	
December	Maximum	39	38	36	36	36	39	40	40	40	38	38	36	36	36	34	34	34	34	34	33	34	34	33	34	34	35	36	35	34	34	36	36	
	Minimum	38	36	34	35	35	36	38	40	38	38	36	36	33	33	33	33	34	34	34	33	33	33	33	34	34	35	34	33	33	33	33	33	
	Average	38	37	35	36	36	38	39	39	39	39	38	38	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	
January	Maximum	34	34	38	37	38	37	38	37	37	36	34	34	34	34	34	34	34	34	34	36	37	37	39	40	40	40	34	33	34	34	36	36	
	Minimum	33	34	34	36	37	36	37	36	33	33	33	33	33	33	34	34	34	34	34	36	36	37	39	40	40	34	33	34	34	34	36	36	
	Average	33	34	36	37	37	37	37	37	36	36	36	36	36	36	36	36	36	36	36	36	37	37	39	40	40	37	36	37	37	37	37	37	
February	Maximum	37	37	36	36	39	39	39	36	35	34	35	33	33	33	33	37	37	38	39	39	38	37	36	35	35	36	35	34	36	38	--	36	
	Minimum	36	36	34	34	36	37	36	34	34	33	33	33	33	33	35	35	35	36	35	38	37	35	34	34	33	34	34	33	34	34	--	35	
	Average	36	36	34	34	37	38	38	36	36	36	36	36	36	36	36	36	36	36	36	38	37	36	36	36	36	36	36	36	36	36	36	--	
March	Maximum	40	42	42	41	41	37	39	38	38	40	39	42	42	43	42	42	40	37	39	42	43	44	44	44	44	40	39	41	39	40	41	41	
	Minimum	38	37	41	41	34	34	37	36	36	35	37	38	41	38	38	35	33	37	38	38	39	42	40	36	34	37	37	37	37	37	37	37	
	Average	39	39	39	39	35	35	38	38	38	38	38	41	40	39	39	39	39	38	38	40	40	41	41	40	39	40	40	40	40	40	40	40	
April	Maximum	41	44	45	45	43	45	43	45	48	48	52	52	49	51	55	59	56	51	53	53	53	52	53	52	53	56	57	55	56	53	52	--	50
	Minimum	36	41	41	38	40	42	43	39	37	41	43	47	49	46	47	52	51	48	48	48	48	48	48	48	48	50	49	53	52	50	--	46	
	Average	38	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	--	
May	Maximum	52	57	60	60	63	63	65	62	61	59	59	60	61	64	60	61	64	60	65	65	65	65	65	63	62	59	58	55	58	58	60	61	
	Minimum	50	51	54	57	58	59	58	60	55	53	53	53	52	49	51	55	55	54	52	56	56	56	56	55	56	53	52	50	52	54	54	54	
	Average	51	54	56	58	61	61	62	61	60	60	60	60	60	61	61	61	61	61	61	61	61	61	61	61	60	59	57	56	57	57	57	57	
June	Maximum	58	54	57	59	60	62	59	64	66	64	59	58	65	64	61	59	55	60	67	64	66	68	63	64	68	69	69	70	71	--	63	64	
	Minimum	51	51	49	50	52	54	56	55	60	59	54	55	58	55	51	53	54	59	61	60	62	58	55	58	61	61	62	63	--	56	56		
	Average	54	52	53	54	56	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57		
July	Maximum	67	70	68	66	65	62	60	64	66	64	61	58	60	63	66	69	65	69	70	70	70	70	69	67	68	68	66	64	61	66	61		
	Minimum	63	62	61	58	56	57	59	56	57	58	57	55	55	55	58	58	61	62	60	63	62	62	62	63	60	61	61	61	61	61	61		
	Average	65	66	64	62	61	62	61	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62		
August	Maximum	64	69	71	69	67	64	66	62	68	60	58	57	58	58	56	61	60	57	56	56	56	59	59	59	59	61	62	64	60	61	61		
	Minimum	58	61	64	64	61	59	60	55	51	54	56	55	53	51	52	54	54	52	54	54	54	55	55	55	55	55	55	55	55	55	55		
	Average	61	65	67	66	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62		
September	Maximum	60	57	62	63	60	57	59	60	60	59	58	54	52	52	51	56	55	54	55	58	59	60	58	55	54	54	54	51	51	52	--	56	
	Minimum	44	55	55	59	56	54	53	57	57	58	54	50	49	50	47	48	50	49	48	50	50	50	50	50	50	50	50	50	50	50	50	50	
	Average	52	61	58	61	57	56	56	58	58	58	58	57	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	

Temperature (°F) of water, water year October 1963 to September 1964  
(Continuous ethyl alcohol-actuated thermograph)

Day



STREAMS TRIBUTARY TO LAKE HURON  
4-1280. STURGEON RIVER NEAR WOLVERINE, MICH.

LOCATION.--Temperature recorder at gaging station on left bank, 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 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 75°F June 30; minimum, freezing point on many days during January to March.

EXTREMES, 1958-64.--Water temperatures: Maximum, 75°F June 30, 1964; minimum, freezing point on many days during winter months.

REMARKS.--Recorder stopped July 14 to Aug. 18, range 57°F to 73°F, recorder bulb covered with sand Apr. 26 to May 12.

Temperature (°F) of water, water year October 1963 to September 1964  
(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	53	55	55	52	51	55	55	52	51	52	53	52	51	50	50	52	54	54	54	53	53	54	56	55	54	54	52	49	47	45	44	52	
	48	51	52	49	48	50	52	49	48	49	51	50	49	49	48	49	50	52	52	53	52	51	52	52	52	50	49	47	45	44	44	50	
November	44	44	43	43	44	45	45	45	43	45	45	43	42	42	42	43	45	45	44	44	46	46	46	41	39	40	40	42	42	39	--	43	
	44	43	42	42	43	44	44	43	43	43	43	42	42	42	41	42	43	44	42	41	42	44	41	39	38	38	40	40	39	--	42	42	
December	38	37	37	36	37	38	38	38	37	36	35	35	35	35	34	34	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	35	
	37	37	36	36	36	37	38	37	36	35	35	35	35	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	35	
January	33	33	33	33	33	33	33	34	34	34	32	32	32	32	32	32	32	32	32	32	34	35	36	36	36	32	32	32	32	32	32	33	
	33	33	33	33	32	33	33	34	32	32	32	32	32	32	32	32	32	32	32	32	32	34	35	36	36	32	32	32	32	32	32	33	
February	35	35	34	32	35	35	35	34	32	32	32	32	32	33	34	34	34	37	36	35	34	32	32	32	32	32	32	32	32	32	32	33	
	32	33	32	32	32	34	34	32	32	32	32	32	32	33	32	33	32	33	35	34	32	32	32	32	32	32	32	32	32	32	32	32	
March	37	38	38	38	38	37	36	35	36	35	37	37	38	37	37	37	37	35	35	36	38	38	39	40	40	36	36	36	36	38	37	34	
	33	36	37	38	32	33	34	35	34	35	34	34	37	35	35	34	33	33	35	36	36	35	37	38	39	36	36	36	36	38	34	34	
April	39	40	40	39	40	40	40	40	40	40	43	43	45	45	44	44	48	54	51	47	49	48	46	46	48	51	53	--	--	--	--	45	
	34	36	37	34	36	39	40	36	35	38	39	42	43	41	41	40	42	47	45	44	45	46	44	44	43	44	46	--	--	--	--	41	
May	--	--	--	--	--	--	--	--	--	--	--	57	56	56	55	60	60	58	62	59	59	61	64	64	63	61	57	57	57	57	57	57	
	--	--	--	--	--	--	--	--	--	--	--	52	53	51	51	53	53	53	56	53	53	56	58	59	56	57	54	54	54	54	54	--	
June	58	56	55	57	60	62	63	67	65	61	59	65	64	63	60	58	58	62	59	68	66	68	70	68	62	71	71	71	73	75	--	64	
	53	53	53	53	55	57	57	61	60	56	57	57	59	58	56	55	55	60	63	61	64	58	55	50	64	63	65	67	--	--	--	58	
July	72	68	69	68	67	65	65	67	69	68	65	61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	66	64	64	62	61	61	61	61	61	62	63	61	60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
August	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
September	61	61	62	63	61	58	59	61	61	61	60	55	54	54	52	50	57	56	56	57	58	58	56	54	53	53	52	51	51	--	57	--	
	56	57	59	61	57	54	56	58	59	60	55	52	51	51	50	50	54	56	55	56	55	56	58	56	54	52	52	50	49	49	--	54	





## STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1365. AU SABLE RIVER AT MIO, MICH.

LOCATION.--Temperature recorder at gaging station on right bank, 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 1964.

EXTREMES: 1963-64.--Water temperatures: Maximum, 76°F July 28; minimum, 34°F on many days during January.

EXTREMES: 1952-64.--Water temperatures: Maximum, 77°F Aug. 4, 1953; minimum, freezing point on many days during winter months.

REMARKS.--Flow regulated at all stages by powerplant 500 feet upstream.

Temperature (°F) of water, water year October 1963 to September 1964  
(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	56	56	55	55	55	56	56	55	55	55	55	55	54	54	53	54	54	54	54	54	54	55	56	56	56	57	57	55	54	52	51	55
	Minimum	54	54	53	52	54	55	54	52	53	54	53	52	52	52	52	52	52	52	53	53	54	55	55	56	56	56	55	53	51	50	49	53
November	Maximum	49	47	45	45	45	45	45	46	47	47	46	46	45	44	45	45	45	46	46	47	47	47	47	47	47	47	47	44	42	41	40	45
	Minimum	47	44	43	43	44	44	44	45	46	46	46	46	45	44	44	44	44	44	44	44	44	46	45	44	43	42	41	40	39	39	--	44
December	Maximum	39	39	38	38	38	37	38	37	37	37	37	37	37	36	36	36	36	35	35	35	35	35	35	35	35	35	35	35	35	35	35	36
	Minimum	39	38	38	37	37	36	37	37	37	36	37	37	36	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	36
January	Maximum	35	35	35	35	35	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	34
	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	35	35	35
February	Maximum	36	36	36	36	36	36	36	37	37	37	38	38	37	36	36	36	36	36	37	37	37	38	37	37	37	37	36	36	36	36	36	37
	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	35	35	36
March	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	35	35	36
	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	35	35	36
April	Maximum	38	37	39	39	39	40	41	40	41	43	42	44	47	47	47	48	51	51	51	49	48	47	48	49	49	50	51	51	50	--	46	
	Minimum	36	37	37	37	38	39	39	40	40	41	44	45	45	46	47	49	48	49	47	46	46	45	45	46	48	49	50	49	--	43		
May	Maximum	51	52	53	56	59	60	62	62	60	59	59	57	59	58	59	61	61	62	64	65	65	66	66	66	66	60	60	60	59	57	60	
	Minimum	49	49	50	52	55	56	59	61	59	58	56	55	54	55	56	56	59	59	59	59	59	61	62	64	65	62	60	60	59	57	56	57
June	Maximum	59	58	57	58	60	60	59	62	67	66	65	64	67	67	66	65	64	66	66	65	67	73	70	68	70	70	70	74	--	65		
	Minimum	55	56	55	55	56	57	58	60	63	63	63	63	63	63	63	62	62	63	64	65	66	66	66	66	66	68	68	70	74	--	62	
July	Maximum	73	73	74	73	72	71	69	69	70	70	69	68	68	66	66	66	70	71	70	73	74	74	74	74	74	74	75	75	76	73	72	72
	Minimum	71	71	71	70	68	66	67	67	67	68	66	66	63	63	65	66	69	70	71	72	71	72	71	72	72	72	72	70	69	69	69	69
August	Maximum	70	70	69	71	70	71	70	66	65	64	64	61	61	61	62	61	62	61	60	62	62	62	62	63	63	63	64	64	66	65	65	65
	Minimum	69	68	67	69	69	69	66	65	64	63	61	60	59	60	59	60	59	60	60	60	60	60	60	60	60	61	61	61	62	62	63	63
September	Maximum	64	65	65	66	65	64	64	64	65	64	63	62	62	62	60	57	59	58	56	58	59	61	60	59	59	59	58	56	55	--	59	
	Minimum	63	63	63	65	64	63	63	62	62	62	61	61	60	57	56	56	56	55	56	57	58	59	59	59	58	55	54	54	--	51		

## STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1380, EAST BRANCH AU GRES RIVER AT MCIVOR, MICH.

LOCATION.--Temperature recorder at gaging station on right bank, 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 1964.

EXTREMES, 1961-64.--Water temperatures: Maximum, 79°F June 30; minimum, freezing point on many days during December to February.

EXTREMES, 1951-64.--Water temperatures: Maximum, 79°F June 30, 1964; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964

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















## STREAMS TRIBUTARY TO LAKE ERIE

## 4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.

LOCATION.--At gaging station on left bank at highway bridge, 4 miles south of Fort Wayne, Allen County, and 12 miles upstream from confluence with St. Joseph River.

DRAINAGE AREA (revised).--782 square miles.

RECORDS AVAILABLE.--Sediment records: May 1953 to September 1964.

EXTREMES, 1953-64.--Sediment concentrations: Maximum daily, 2,060 ppm Feb. 25, 1956; minimum daily,

1 ppm on many days 1955-56, 1960-61.

Sediment loads: Maximum daily, 30,800 tons Feb. 11, 1959; minimum daily, less than 0.50 ton on many days 1953-57, 1959-64.

REMARKS.--Flow regulated by Lake St. Marys. Some diversion from or into Wabash River basin and into Miami and Erie Canal. Flow affected by ice on many days each year. Sediment discharges computed from field and laboratory data supplied by Indiana Flood Control and Water Resources Commission.

## Suspended sediment, May to September 1953

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..				208	67	38	203	129	71
2..				192	65	34	140	114	43
3..				163	59	26	111	108	32
4..				143	50	19	94	101	26
5..				138	44	16	81	90	20
6..				156	45	19	72	78	15
7..				173	47	22	65	65	11
8..				170	52	24	61	60	10
9..				184	57	28	69	57	11
10..				174	60	28	75	58	12
11..				151	58	24	81	62	14
12..				133	50	18	85	68	16
13..				119	42	13	96	80	21
14..				117	37	12	231	134	84
15..				117	34	11	214	82	47
16..				140	35	13	140	57	22
17..				197	44	23	100	46	12
18..				292	87	68	78	38	8
19..				502	--	E 320	67	33	6
20..				560	--	E 230	59	28	4
21..				590	--	E 160	53	26	4
22..				785	--	E 410	48	25	3
23..				920	--	E 800	43	24	3
24..				885	--	748	41	21	2
25..				832	188	422	37	19	2
26..				920	--	E 480	41	37	4
27..				1140	--	E 850	46	96	12
28..				1300	--	E 1100	43	92	11
29..				1140	--	E 900	39	76	8
30..				725	--	E 470	34	66	6
31..				390	176	180	--	--	--
Total				13656	--	7506	2547	--	540

E Estimated.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, May to September 1953--Continued

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..	34	66	6	31	62	5	19	60	3
2..	52	77	11	77	--	E 30	19	61	3
3..	79	96	20	58	114	18	19	62	3
4..	80	96	21	42	99	11	19	62	3
5..	69	81	15	46	87	11	19	63	3
6..	77	70	14	51	78	11	18	64	3
7..	132	98	35	54	74	11	19	65	3
8..	205	--	E 110	68	87	S 16	21	66	4
9..	121	--	E 55	185	--	E 160	24	67	4
10..	80	--	E 30	90	165	40	34	68	6
11..	64	127	22	65	141	25	31	69	6
12..	55	111	16	79	151	32	26	70	5
13..	47	97	12	89	166	40	24	70	4
14..	42	92	10	67	154	28	23	71	4
15..	39	90	9	51	140	19	22	72	4
16..	36	91	9	40	123	13	25	73	5
17..	34	92	8	33	105	9	26	74	5
18..	33	94	8	28	90	7	25	74	5
19..	40	94	10	25	81	5	27	75	5
20..	34	93	8	23	74	4	36	76	7
21..	30	87	7	20	69	4	36	77	7
22..	31	79	7	18	66	3	28	77	6
23..	33	72	6	19	65	3	24	78	5
24..	28	65	5	22	64	4	21	78	4
25..	27	65	5	23	63	4	19	78	4
26..	28	81	6	21	63	4	18	78	4
27..	25	74	5	19	62	3	18	78	4
28..	29	64	5	17	61	3	16	78	3
29..	33	58	5	16	61	3	16	78	3
30..	27	55	4	15	60	2	16	78	3
31..	23	52	3	16	59	2	--	--	--
Total	1667	--	487	1408	--	530	688	--	128
Total discharge for period (cfs-days).....									19966
Total load for period (tons).....									9191

E Estimated.

S Computed by subdividing day.



## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1953 to September 1954

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..	21	77	4	18	18	1	20	10	1
2..	19	74	4	18	17	1	20	10	1
3..	17	70	3	18	15	1	20	10	1
4..	17	67	3	20	15	1	21	11	1
5..	16	63	3	24	12	1	19	11	1
6..	16	62	3	22	10	1	24	11	1
7..	16	58	2	20	7	T	28	10	1
8..	17	57	3	19	5	T	24	9	1
9..	17	56	2	18	3	T	24	10	1
10..	17	52	2	16	3	T	24	10	1
11..	16	49	2	16	4	T	24	11	1
12..	16	47	2	17	3	T	24	10	1
13..	16	47	2	17	5	T	24	11	1
14..	17	46	2	18	7	T	28	11	1
15..	17	45	2	18	10	T	29	10	1
16..	16	44	2	16	11	T	32	10	1
17..	15	43	2	16	12	T	29	10	1
18..	15	42	2	16	13	1	28	9	1
19..	14	40	2	16	14	1	29	10	1
20..	13	37	1	17	13	1	27	10	1
21..	14	35	1	19	12	1	26	10	1
22..	15	33	1	23	12	1	33	11	1
23..	15	30	1	25	10	1	42	12	1
24..	13	27	1	26	11	1	37	13	1
25..	13	24	1	24	11	1	34	14	1
26..	15	20	1	24	11	1	34	14	1
27..	15	21	1	24	11	1	34	15	1
28..	15	21	1	23	11	1	34	15	1
29..	19	22	1	24	11	1	34	12	1
30..	20	22	1	22	10	1	32	11	1
31..	18	20	1	--	--	--	33	10	1
Total	500	--	59	594	--	22	871	--	31
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..	25	10	1	178	140	67	1460	516	2030
2..	24	10	1	140	121	46	885	284	679
3..	24	10	1	85	98	22	650	176	309
4..	24	10	1	58	79	12	515	113	157
5..	28	10	1	43	55	6	390	79	83
6..	28	11	1	37	34	3	352	65	62
7..	24	13	1	32	26	2	202	44	24
8..	29	12	1	28	23	2	170	30	14
9..	21	10	1	25	18	1	148	21	8
10..	22	10	1	23	14	1	131	26	9
11..	24	9	1	21	11	1	113	33	10
12..	26	9	1	20	9	T	98	22	6
13..	29	6	T	18	6	T	95	17	4
14..	33	6	1	19	4	T	83	25	6
15..	32	6	1	21	9	1	76	15	3
16..	29	6	T	219	482	486	68	8	1
17..	28	6	T	502	605	820	62	11	2
18..	33	6	1	264	228	162	57	17	3
19..	42	7	1	178	115	55	59	26	4
20..	60	26	4	147	76	30	97	49	13
21..	94	49	12	128	63	22	125	31	10
22..	75	44	9	106	55	16	131	26	9
23..	62	33	6	95	45	12	122	26	8
24..	54	20	3	85	33	8	125	24	8
25..	48	11	1	80	32	7	507	250	518
26..	51	11	2	84	24	5	575	309	480
27..	407	400	S 483	92	158	39	340	130	119
28..	328	446	395	1440	494	S 2200	244	73	48
29..	171	249	115	--	--	--	340	72	66
30..	197	170	90	--	--	--	1140	244	751
31..	218	155	91	--	--	--	1220	217	715
Total	2290	--	1228	4168	--	4027	10580	--	6159

S Computed by subdividing day.

T Less than 0.5 ton.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	Mean discharge (cfs)	APRIL		Mean discharge (cfs)	MAY		Mean discharge (cfs)	JUNE	
		Suspended sediment			Suspended sediment			Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	955	167	431	114	57	18	944	834	S 2520
2..	800	128	276	715	978	S 2400	1140	664	2040
3..	725	100	196	1460	1010	3980	955	343	884
4..	605	87	142	885	298	712	955	291	750
5..	560	70	106	530	99	142	680	213	391
6..	308	65	54	452	83	101	415	157	176
7..	264	81	58	428	129	149	257	119	82
8..	221	73	44	328	127	112	184	91	45
9..	246	72	48	231	84	52	135	71	26
10..	340	122	112	235	58	37	111	35	10
11..	1100	369	S 1200	182	65	32	115	38	12
12..	1860	478	2400	159	63	27	235	93	64
13..	1420	256	982	154	55	23	270	406	296
14..	885	170	406	146	47	18	148	266	106
15..	710	147	282	129	40	14	131	137	48
16..	695	212	398	111	37	11	111	105	31
17..	1100	223	662	98	37	10	87	100	23
18..	1220	208	685	87	45	10	144	128	50
19..	990	169	452	78	60	13	192	234	121
20..	955	149	384	71	71	14	268	721	522
21..	885	147	351	63	78	13	163	285	125
22..	770	134	278	60	73	12	107	164	47
23..	545	123	181	56	72	11	74	136	27
24..	340	98	90	52	65	9	55	115	17
25..	236	72	46	49	55	7	42	102	12
26..	186	65	33	44	55	6	35	95	9
27..	160	66	28	41	64	7	33	89	8
28..	147	70	28	40	77	8	29	90	7
29..	133	67	24	50	83	11	26	85	6
30..	120	61	20	65	87	15	24	80	5
31..	--	--	--	65	103	S 21	--	--	--
Total	19481	--	10397	7178	--	7995	8065	--	8460
JULY				AUGUST			SEPTEMBER		
1..	23	80	5	17	90	4	312	121	102
2..	20	81	4	16	87	4	163	82	36
3..	19	90	5	16	70	3	108	67	20
4..	19	91	5	19	80	4	88	65	15
5..	21	71	4	1130	940	S 3810	59	64	10
6..	22	66	4	1540	631	2800	50	62	8
7..	80	209	S 49	885	318	760	42	67	8
8..	100	130	35	755	277	565	54	88	13
9..	90	101	24	850	216	496	47	91	12
10..	76	97	20	1060	167	478	35	91	8
11..	55	83	12	1220	141	464	30	83	7
12..	48	74	10	1060	132	378	26	58	4
13..	40	76	8	725	106	207	24	63	4
14..	31	80	7	378	71	72	28	70	5
15..	23	79	5	194	56	29	30	61	5
16..	19	71	5	148	58	23	28	65	5
17..	17	61	3	121	62	20	29	78	6
18..	43	75	9	123	178	S 68	28	73	6
19..	67	75	14	1360	500	1840	24	73	5
20..	54	84	12	1420	329	1260	25	75	5
21..	39	101	11	770	206	428	28	75	6
22..	32	102	9	440	171	203	28	75	6
23..	22	95	6	259	128	90	27	73	5
24..	18	86	4	166	96	43	26	71	5
25..	16	76	3	125	91	31	24	72	5
26..	15	63	2	956	446	S 1420	20	71	4
27..	16	64	3	1380	343	1280	18	73	4
28..	18	76	4	1060	242	693	18	73	4
29..	20	82	4	785	230	487	22	75	4
30..	18	92	4	680	196	360	37	90	9
31..	18	93	4	545	164	241	--	--	--
Total	1099	--	294	20203	--	18561	1478	--	336

Total discharge for year (cfs-days)..... 76507

Total load for year (tons)..... 57569

S Computed by subdividing day.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1954 to September 1955

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	76	14	111	7	2	785	34	72
2..	111	122	40	106	7	2	680	28	51
3..	359	—	E 290	99	6	2	590	22	35
4..	955	290	A 750	96	6	2	478	18	23
5..	1920	278	S 1800	121	7	2	352	15	14
6..	2220	190	S 1200	162	8	3	259	12	8
7..	1050	107	303	187	8	4	233	9	6
8..	490	72	95	197	9	5	221	12	7
9..	308	72	60	218	7	4	216	19	11
10..	1800	191	S 976	200	6	3	173	28	13
11..	1950	164	863	168	7	3	143	23	9
12..	3050	202	1660	143	8	3	124	4	1
13..	3100	114	954	125	7	2	117	3	1
14..	2780	154	1160	113	8	2	113	4	1
15..	4050	207	2260	106	7	2	111	3	1
16..	3750	105	1060	99	7	2	109	3	1
17..	2780	61	458	95	6	2	107	2	1
18..	2130	57	328	90	11	3	154	4	2
19..	1860	58	291	384	118	S 162	189	7	4
20..	1590	55	236	920	147	365	166	7	3
21..	1180	54	172	605	71	116	134	4	1
22..	815	51	112	352	38	36	143	5	2
23..	515	53	74	277	21	16	147	5	2
24..	328	47	42	308	18	15	139	3	1
25..	229	34	21	378	20	20	126	3	1
26..	187	34	17	478	23	30	113	2	1
27..	162	38	17	530	22	31	206	129	S 117
28..	146	26	10	817	31	S 73	1660	385	S 1610
29..	137	17	6	1420	111	426	2720	198	1450
30..	128	12	4	1140	68	209	2780	73	548
31..	119	9	3	—	—	—	2320	86	539
Total	40265	—	15276	10045	—	1547	15808	—	4536
Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	1860	92	462	82	3	1	4110	807	8960
2..	2270	124	760	82	2	T	4230	533	6090
3..	2080	84	472	82	2	T	3450	191	1780
4..	1770	54	258	82	2	T	5610	736	S 11700
5..	2040	84	S 499	82	2	T	7790	885	18600
6..	3750	349	3530	82	1	T	7670	443	9170
7..	4230	300	3430	84	2	T	6110	255	4210
8..	4050	135	1480	90	3	1	4470	185	2230
9..	3570	104	1000	120	4	1	2670	130	937
10..	2880	111	863	300	305	S 30	1340	178	S 596
11..	2180	83	488	280	75	57	2830	1300	9930
12..	1420	60	230	250	55	37	2880	870	6760
13..	920	53	132	230	26	16	1860	352	S 1860
14..	605	38	62	240	21	14	1260	295	1000
15..	415	27	30	220	22	13	1260	292	993
16..	328	24	21	400	25	27	1300	201	706
17..	280	14	10	590	38	60	1300	138	484
18..	230	8	5	700	35	66	990	126	337
19..	200	8	4	800	25	54	800	109	235
20..	180	7	3	1020	48	S 143	665	91	163
21..	160	6	2	1900	168	862	1300	218	S 862
22..	150	5	2	2000	170	918	2830	480	3670
23..	139	4	2	1720	118	548	2320	396	2480
24..	128	5	2	1380	96	358	1590	178	764
25..	120	4	1	1460	197	776	1460	140	552
26..	111	7	2	1460	69	272	1420	122	468
27..	106	7	2	2130	186	S 1180	1100	93	276
28..	100	5	1	2520	192	1310	770	82	170
29..	94	3	1	—	—	—	710	66	126
30..	89	4	1	—	—	—	1140	95	292
31..	82	5	1	—	—	—	1260	98	333
Total	36537	—	13756	20386	—	6746	78495	—	96734

E Estimated.

S Computed by subdividing day.

T Less than 0.5 ton.

A Computed from partly estimated-concentration graph.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1954 to September 1955--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..	1020	74	204	227	104	64	42	74	8
2..	815	75	165	187	73	37	48	87	11
3..	680	77	141	159	42	18	61	86	14
4..	515	79	110	138	32	12	53	78	11
5..	390	73	77	122	22	7	42	78	9
6..	305	70	58	107	23	7	36	88	8
7..	242	58	38	97	20	5	36	104	10
8..	202	40	22	88	23	5	61	107	18
9..	173	33	15	82	23	5	113	86	26
10..	150	54	22	86	27	6	117	75	24
11..	140	68	26	90	37	9	97	72	19
12..	156	72	30	83	29	6	110	72	21
13..	194	83	43	72	38	7	139	72	27
14..	315	99	84	64	44	8	129	69	24
15..	800	375	810	61	48	8	106	63	18
16..	605	183	299	60	68	11	92	72	18
17..	440	107	127	55	62	9	82	74	16
18..	328	107	95	48	66	8	69	84	16
19..	272	94	69	45	78	9	57	72	11
20..	452	133	162	44	84	10	48	84	11
21..	428	123	142	42	81	9	42	85	10
22..	302	92	75	40	72	8	35	78	7
23..	240	96	62	42	82	9	30	76	6
24..	1280	694	S 3100	43	80	9	25	78	5
25..	3220	622	5410	45	91	11	22	75	4
26..	2370	--	E 2600	51	111	15	20	67	4
27..	1080	--	E 900	53	109	16	20	68	4
28..	590	--	E 370	48	102	13	27	55	4
29..	428	--	E 200	47	86	11	34	58	5
30..	305	119	98	46	75	9	34	61	6
31..	--	--	--	43	65	8	--	--	--
Total	18437	--	15554	2415	--	369	1827	--	375
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..	29	54	4	45	140	17	17	113	5
2..	23	50	3	43	86	10	14	107	4
3..	18	42	2	34	72	7	14	98	4
4..	16	49	2	30	69	6	14	93	4
5..	16	70	3	24	49	3	12	100	3
6..	17	80	4	46	110	S 34	12	105	3
7..	23	72	4	428	638	737	14	101	4
8..	34	69	6	328	664	588	14	102	4
9..	48	74	10	194	343	180	14	115	4
10..	66	222	40	102	225	62	14	124	5
11..	27	138	10	69	193	36	13	139	5
12..	26	105	7	58	175	27	12	100	3
13..	30	85	7	48	170	22	12	81	3
14..	37	103	S 11	40	138	15	10	80	2
15..	1090	1150	S 4170	34	110	10	10	77	2
16..	1380	935	3480	30	113	9	13	90	3
17..	740	417	833	28	112	8	15	113	4
18..	390	266	280	24	92	6	15	120	5
19..	219	186	110	22	89	5	14	91	3
20..	146	154	61	20	90	5	14	72	3
21..	115	137	42	19	90	5	13	84	3
22..	84	132	30	23	108	7	14	71	3
23..	59	119	19	37	105	10	17	88	4
24..	43	107	12	54	120	17	18	72	3
25..	34	117	11	44	117	14	19	70	4
26..	38	146	15	32	122	10	18	77	4
27..	47	122	15	24	95	6	19	70	4
28..	53	109	16	22	85	5	20	72	4
29..	117	175	55	21	114	6	32	95	8
30..	68	224	41	21	109	6	38	93	10
31..	53	214	31	18	117	6	--	--	--
Total	5086	--	9334	1962	--	1879	475	--	120

Total discharge for year (cfs-days)..... 231738  
 Total load for year (tons)..... 166226

E Estimated.

S Computed by subdividing day.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FT. WAYNE, IND.--Continued

Suspended sediment, water year October 1955 to September 1956

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..	34	83	8	65	16	3	155	10	4
2..	28	95	7	314	--	E 180	165	7	3
3..	24	82	5	2470	298	1990	200	5	3
4..	26	77	5	2470	145	967	283	15	11
5..	67	86	16	1590	91	391	428	36	42
6..	77	88	18	920	82	204	315	33	28
7..	266	284	5	725	83	162	257	19	13
8..	452	387	472	620	62	104	220	13	8
9..	315	240	204	465	43	54	198	7	4
10..	212	190	109	310	32	27	162	5	2
11..	198	153	82	219	26	15	143	3	1
12..	176	123	58	173	27	13	130	4	1
13..	134	101	36	151	--	E 20	115	5	2
14..	100	87	23	250	440	B 300	108	7	2
15..	79	77	16	160	109	47	102	7	2
16..	65	77	14	2190	594	S 4040	100	3	1
17..	64	69	12	3930	494	5240	96	4	1
18..	100	80	22	3930	254	2700	92	4	1
19..	139	107	40	2830	120	917	90	2	7
20..	117	94	30	1540	90	374	86	3	1
21..	171	98	45	1340	85	308	84	5	1
22..	195	96	50	1340	88	318	80	6	1
23..	150	94	38	1340	72	260	80	3	1
24..	120	92	30	1140	52	160	90	2	7
25..	111	68	20	800	40	86	100	3	1
26..	111	63	19	620	25	42	102	4	1
27..	98	72	19	490	20	26	90	3	1
28..	83	80	18	378	21	21	84	2	7
29..	72	83	16	270	21	15	80	7	2
30..	67	53	10	199	17	9	74	6	1
31..	64	30	5	--	--	--	70	5	1
Total	3915	--	1664	33239	--	18993	4379	--	141
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..	66	2	T	560	50	76	2140	252	1460
2..	63	2	T	452	22	27	2540	277	1900
3..	59	1	T	465	15	19	2340	244	1540
4..	59	1	T	402	14	15	2440	309	2040
5..	59	3	T	308	14	12	1680	165	748
6..	60	4	1	250	9	6	1720	672	S 3340
7..	60	3	T	219	7	4	2440	630	4150
8..	60	3	T	275	8	6	2940	812	6440
9..	60	3	T	1150	26	S 93	2760	450	3350
10..	65	5	1	2270	72	441	1950	315	1660
11..	63	5	1	2520	80	544	1560	250	1050
12..	62	5	1	2130	69	397	1400	200	756
13..	59	5	1	2040	55	303	1160	158	495
14..	58	5	1	2940	102	810	815	122	268
15..	59	4	1	3570	180	1740	581	101	158
16..	62	2	T	3000	94	761	502	78	106
17..	64	2	T	1820	58	285	554	65	97
18..	61	4	1	2520	164	S 115	554	49	73
19..	63	2	T	3160	262	2240	554	38	57
20..	61	1	T	2470	115	767	554	39	58
21..	61	1	T	1720	83	385	609	50	82
22..	60	2	T	1420	68	261	785	87	184
23..	60	1	T	1180	49	156	845	102	233
24..	60	3	T	885	44	105	1770	434	2070
25..	59	5	1	4410	2060	S 26000	1680	310	1410
26..	60	4	1	4380	1160	13700	1200	153	496
27..	63	3	1	3540	520	4970	1120	139	420
28..	70	3	1	2490	321	2160	1900	453	S 2640
29..	232	19	S 15	2140	262	1510	2240	356	2150
30..	785	40	85	--	--	--	1520	140	574
31..	850	47	108	--	--	--	1050	178	505
Total	3583	--	225	54686	--	59023	45903	--	40510

E Estimated.

S Computed by subdividing day.

T Less than 0.5 ton.

B Computed from estimated-concentration graph.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FT. WAYNE, IND.--Continued

Suspended sediment, water year October 1955 to September 1956--Continued

Day	Mean discharge (cfs)	APRIL Suspended sediment		Mean discharge (cfs)	MAY Suspended sediment		Mean discharge (cfs)	JUNE Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	875	124	293	278	98	74	2490	392	2640
2..	725	115	225	428	140	162	1600	204	881
3..	554	108	162	502	155	210	910	137	337
4..	502	134	182	360	104	101	609	116	191
5..	875	548	1290	278	73	55	382	101	104
6..	845	464	1060	232	66	41	259	63	44
7..	1050	440	1250	218	82	188	85	85	43
8..	1440	328	1280	278	146	110	156	88	37
9..	1280	195	674	188	99	50	134	107	39
10..	875	135	319	546	--	E 950	127	119	41
11..	665	102	183	1360	540	A 2000	102	108	30
12..	477	93	120	755	188	383	90	108	26
13..	360	103	100	428	147	170	76	170	35
14..	297	102	82	318	125	107	69	168	31
15..	259	100	70	241	116	75	62	174	29
16..	223	85	51	205	81	45	57	154	24
17..	188	62	31	172	70	32	54	182	26
18..	164	40	18	156	65	27	152	--	E 310
19..	141	36	14	141	63	24	815	1200	A 2600
20..	127	28	10	120	65	21	845	640	1460
21..	114	45	14	108	68	20	554	330	494
22..	102	60	16	172	130	S 65	528	275	392
23..	96	53	14	259	88	62	452	530	A 650
24..	90	51	12	214	76	44	695	870	1630
25..	84	50	11	164	65	29	1080	1450	4230
26..	84	43	10	156	67	28	581	690	1080
27..	84	66	15	134	73	26	581	1040	1630
28..	90	77	19	270	--	E 380	452	695	848
29..	236	576	S 471	477	--	E 600	232	470	294
30..	339	298	273	819	550	A 1200	141	265	101
31..	--	--	--	2000	650	A 3500	--	--	--
Total	13241	--	8269	12077	--	10673	14473	--	20277
Day	Mean discharge (cfs)	JULY		Mean discharge (cfs)	AUGUST		Mean discharge (cfs)	SEPTEMBER	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	134	188	68	180	218	106	43	150	17
2..	114	204	63	156	189	80	72	138	27
3..	90	210	51	141	190	72	205	177	98
4..	69	190	35	102	174	48	172	169	78
5..	62	174	29	90	148	36	108	142	41
6..	57	162	25	102	165	45	72	137	27
7..	51	125	17	84	138	31	52	122	17
8..	54	157	23	62	127	21	40	85	9
9..	61	155	26	50	137	18	35	113	11
10..	55	109	16	47	154	20	34	126	12
11..	46	82	10	62	131	22	34	109	10
12..	39	105	11	49	116	15	33	129	11
13..	39	125	13	55	144	24	31	220	18
14..	36	127	12	416	585	657	29	148	12
15..	211	295	S 185	233	305	192	28	132	10
16..	196	405	214	127	202	69	29	125	10
17..	196	323	171	90	155	38	31	143	12
18..	196	305	161	72	168	33	32	129	11
19..	134	252	91	55	152	22	33	107	10
20..	228	700	A 430	43	128	15	33	93	8
21..	755	1000	A 2000	43	124	14	33	82	7
22..	452	240	293	45	121	15	32	96	8
23..	278	348	261	36	107	10	32	110	10
24..	188	255	129	30	108	9	33	90	8
25..	120	200	65	34	123	11	31	96	8
26..	1700	1130	S 5770	39	174	18	32	108	9
27..	793	544	S 1300	38	142	14	33	98	9
28..	503	382	S 551	38	147	15	32	85	7
29..	1200	788	2550	41	142	16	31	89	7
30..	701	414	S 831	42	131	15	30	104	8
31..	278	245	184	42	137	16	--	--	--
Total	9036	--	15585	2644	--	1717	1465	--	530

Total discharge for year (cfs-days)..... 198641

Total load for year (tons)..... 177607

E Estimated. A Computed from partly estimated-concentration graph.

S Computed by subdividing day.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1956 to September 1957

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..	32	67	6	25	33	2	28	9	1
2..	31	69	6	24	36	2	27	12	1
3..	29	73	6	26	43	3	27	10	1
4..	29	54	4	30	46	4	25	10	1
5..	28	74	6	28	49	4	24	11	1
6..	25	78	5	26	46	3	24	17	1
7..	24	48	3	27	38	3	29	30	2
8..	25	34	2	33	25	2	38	23	2
9..	26	33	2	35	19	2	58	17	3
10..	28	32	2	31	16	1	84	17	4
11..	28	24	2	28	11	1	102	18	5
12..	28	30	2	26	14	1	134	24	9
13..	26	56	4	27	19	1	205	34	19
14..	27	71	5	28	22	2	172	33	15
15..	27	54	4	30	39	3	148	28	11
16..	28	54	4	32	37	3	141	25	10
17..	28	80	6	30	18	1	120	24	8
18..	26	72	5	27	18	1	102	22	6
19..	25	52	4	24	9	1	84	16	4
20..	24	45	3	24	11	1	71	18	3
21..	18	40	2	35	30	3	74	19	4
22..	16	40	2	53	20	3	156	28	12
23..	25	38	2	47	14	2	188	58	29
24..	34	36	3	41	13	1	196	66	35
25..	33	30	3	34	13	1	196	53	28
26..	30	34	3	33	15	1	172	35	16
27..	30	23	2	34	11	1	134	23	8
28..	31	26	2	36	10	1	120	18	6
29..	30	38	3	29	10	1	114	18	6
30..	40	43	3	31	10	1	108	38	11
31..	27	39	3	--	--	--	102	26	7
Total	848	--	109	934	--	56	3203	--	269
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..	102	16	4	260	20	14	1820	152	747
2..	83	15	3	190	5	2	1900	144	739
3..	78	12	2	175	3	1	1950	182	998
4..	86	14	3	175	2	1	1560	115	484
5..	83	8	2	380	5	5	1020	93	256
6..	77	6	1	360	12	12	665	78	140
7..	70	6	1	528	37	53	428	63	73
8..	68	3	1	581	44	69	297	51	41
9..	71	3	1	851	103	S 267	232	34	21
10..	78	5	1	1770	332	1590	205	26	14
11..	84	5	1	1440	237	921	188	28	14
12..	71	6	1	1050	152	431	196	43	23
13..	68	4	1	910	100	246	188	50	25
14..	64	5	1	875	70	165	164	50	22
15..	59	4	1	815	56	123	156	56	24
16..	55	5	1	609	53	87	148	38	15
17..	52	8	1	452	37	45	134	32	12
18..	48	4	1	360	20	19	127	28	10
19..	45	2	1	297	17	14	134	25	9
20..	45	11	1	241	16	10	164	24	11
21..	71	32	1	196	13	7	156	27	11
22..	866	700	A 1600	172	10	5	141	31	12
23..	3120	480	A 4000	164	10	4	134	40	14
24..	2390	272	A 1760	148	13	5	127	52	18
25..	1240	168	562	141	18	7	120	42	14
26..	1080	149	434	327	31	S 46	114	33	10
27..	1430	132	510	2290	453	S 3010	141	24	9
28..	1520	93	382	2540	372	2550	278	38	28
29..	980	61	161	--	--	--	278	37	28
30..	640	38	66	--	--	--	241	33	21
31..	380	27	28	--	--	--	205	30	17
Total	15104	--	9532	18297	--	9709	13611	--	3820

S Computed by subdividing day.

T Less than 0.5 ton.

A Computed from partly estimated-concentration graph.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	APRIL				MAY				JUNE			
	Mean discharge (cfs)	Suspended sediment		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		Mean concentration (ppm)	Tons per day
1..	222	44	S 30	1120	130	393		554	580		868	
2..	1450	338	S 1440	980	129	341		554	340		508	
3..	1900	442	2270	815	123	271		452	265		323	
4..	4150	333	3730	637	106	182		297	192		154	
5..	5930	313	5010	502	87	118		223	128		77	
6..	7200	232	4510	428	87	100		180	109		53	
7..	7790	145	3050	360	84	82		148	93		37	
8..	8830	132	3150	318	79	68		141	95		36	
9..	8670	115	2690	278	85	64		141	99		38	
10..	8070	87	1900	342	98	S 97		141	89		34	
11..	6980	75	1410	2270	721	S 4850		278	--	E	200	
12..	5770	79	1230	3000	561	4540		339	200	A	180	
13..	4660	72	906	2290	284	1760		590	1100	A	1800	
14..	3780	61	622	3120	526	4480		1360	1230		4520	
15..	2590	52	364	3420	420	3880		1440	690		2680	
16..	1560	53	223	2590	192	1340		1440	820		3190	
17..	1280	77	266	1520	208	854		1520	680		2790	
18..	2610	780	A 5500	1080	207	604		1020	404		1110	
19..	4320	1000	A 12000	1160	299	936		1050	393		1110	
20..	4800	440	5700	1280	243	840		581	245		384	
21..	4940	320	4270	1200	177	573		339	185		170	
22..	4940	258	3440	1020	165	454		232	138		86	
23..	4380	186	2200	1080	180	525		188	113		57	
24..	3480	161	1510	1680	272	1230		148	113		45	
25..	2760	160	1190	1720	185	859		120	117		38	
26..	2590	245	1710	1440	144	560		102	97		27	
27..	2640	243	1730	1160	166	520		132	132	S	70	
28..	2290	203	1260	875	160	378		1210	550	A	1800	
29..	1680	153	694	637	140	241		3120	650	A	5500	
30..	1320	133	474	452	121	148		3660	250		2470	
31..	--	--	--	360	170	A 160		--	--		--	
Total	123582	--	74479	39134	--	31443		21700	--		30355	
	JULY				AUGUST				SEPTEMBER			
	Mean discharge (cfs)	Suspended sediment		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		Mean concentration (ppm)	Tons per day
1..	3900	125	1320	141	202	77		29	78		6	
2..	4020	86	933	108	168	49		28	70		5	
3..	3900	70	737	114	138	42		24	83		5	
4..	3360	91	826	102	120	33		23	80		5	
5..	2820	575	4380	76	110	22		21	73		4	
6..	3120	585	4930	62	113	19		17	67		3	
7..	2940	365	2900	53	100	14		16	63		3	
8..	2440	302	1990	47	108	14		14	62		2	
9..	2190	332	1960	44	103	12		11	74		2	
10..	1520	243	997	102	284	S 79		11	81		2	
11..	980	188	497	57	150	23		15	55		2	
12..	665	189	339	45	127	15		20	87		5	
13..	502	190	258	40	88	10		29	102		8	
14..	405	183	200	35	53	5		23	72		4	
15..	339	170	156	41	67	7		20	67		4	
16..	297	155	124	90	140	34		26	90		6	
17..	259	132	92	90	138	34		41	105		12	
18..	241	128	83	49	145	19		30	90		7	
19..	232	132	83	34	158	14		24	102		7	
20..	214	130	75	29	130	10		129	175	S	72	
21..	205	126	70	27	108	8		813	550	A	1200	
22..	196	122	64	27	90	6		875	420	A	1000	
23..	371	200	A 220	24	90	6		477	225		290	
24..	875	600	A 1400	26	101	7		428	185		214	
25..	554	332	497	26	93	6		405	175		191	
26..	428	164	190	31	90	8		382	170		175	
27..	360	153	149	27	98	7		297	125		100	
28..	297	144	115	28	105	8		180	83		40	
29..	232	116	73	29	95	7		114	70		22	
30..	164	128	87	27	84	6		90	63		15	
31..	214	150	87	27	90	6		--	--		--	
Total	38240	--	25802	1658	--	607		4612	--		3411	
Total discharge for year (cfs-days).....											280923	
Total load for year (tons).....											189597	

E Estimated.

A Computed from partly estimated-concentration graph.

S Computed by subdividing day.



## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1957 to September 1958  
(Where no concentrations are reported, loads are estimated)

Day	Mean discharge (cfs)	OCTOBER		NOVEMBER			DECEMBER		
		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..	96	66	17	196	37	20	114	17	5
2..	96	55	14	164	40	18	174	24	11
3..	90	47	11	141	40	15	297	38	30
4..	84	52	12	127	36	12	259	72	50
5..	84	59	13	120	24	8	205	53	29
6..	84	61	14	108	15	4	164	31	14
7..	84	54	12	102	11	3	2440	346	2950
8..	84	55	12	139	85	32	4110	490	5440
9..	78	74	16	415	158	197	3990	262	2820
10..	78	60	13	465	159	200	3160	232	1980
11..	78	47	10	318	56	48	2470	171	1140
12..	78	45	9	365	40	39	1900	123	631
13..	78	45	9	365	50	49	1340	80	289
14..	78	42	9	746	146	412	955	78	201
15..	78	50	10	1640	241	1070	605	51	83
16..	90	58	14	1100	137	407	415	32	36
17..	127	68	23	725	97	190	340	24	22
18..	156	53	22	635	86	147	1470	134	771
19..	196	41	22	725	80	157	4230	536	6120
20..	188	35	18	665	54	97	4870	413	5430
21..	188	38	19	440	37	44	4730	265	3380
22..	164	43	19	340	38	35	4470	197	2380
23..	661	228	653	297	62	50	4410	145	1730
24..	2270	316	1940	259	22	15	3450	113	1050
25..	2080	153	859	214	12	7	2370	120	768
26..	1180	96	306	172	11	5	2940	268	2130
27..	725	68	133	148	10	4	2940	332	2640
28..	605	49	80	134	4	1	2040	151	832
29..	490	34	45	127	4	1	1590	113	485
30..	340	38	35	120	5	2	1420	105	402
31..	250	36	24	--	--	--	1300	87	305
Total	10958	--	4393	11512	--	3289	65168	--	44154
Day	Mean discharge (cfs)	JANUARY		FEBRUARY			MARCH		
		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..	1100	68	202	250	15	10	1770	271	1300
2..	850	65	149	214	15	9	1260	168	572
3..	785	43	91	180	18	9	1180	138	440
4..	750	30	61	180	12	6	1060	113	323
5..	695	25	47	180	7	3	815	74	163
6..	695	25	47	170	6	3	785	75	159
7..	695	26	49	156	6	2	755	83	169
8..	440	17	20	148	9	4	605	80	131
9..	340	18	16	134	15	5	545	50	74
10..	390	18	19	125	10	3	490	25	33
11..	340	19	17	118	17	5	415	35	39
12..	318	18	15	110	22	6	318	33	28
13..	297	33	26	104	25	7	297	27	22
14..	297	19	15	103	18	5	278	23	17
15..	297	22	18	100	13	4	259	22	15
16..	297	16	13	98	17	4	250	19	13
17..	278	14	10	96	14	4	241	15	10
18..	278	17	13	94	8	2	223	15	9
19..	241	45	29	94	12	3	205	20	11
20..	241	30	20	94	9	2	196	20	11
21..	427	35	40	100	12	3	188	19	10
22..	1420	57	1450	120	18	6	196	17	9
23..	1220	343	1790	211	26	15	205	27	15
24..	785	165	350	885	251	736	188	27	14
25..	725	119	233	1260	650	2210	232	30	19
26..	785	116	246	1100	384	1140	575	138	214
27..	785	108	229	1380	254	1000	635	104	178
28..	605	51	83	2130	469	2700	545	50	74
29..	440	27	32	--	--	--	545	46	68
30..	365	19	19	--	--	--	465	50	63
31..	297	17	14	--	--	--	365	51	50
Total	17478	--	5363	9934	--	7906	16086	--	4253

S Computed by subdividing day.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1957 to September 1958--Continued  
(Where no concentrations are reported, loads are estimated)

Day	APRIL			MAY			JUNE		
	Suspended sediment			Suspended sediment			Suspended sediment		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	297	42	34	241		55	53	113	16
2..	250	41	28	223	45	57	142		22
3..	214	40	23	188	35	90	133		32
4..	188	40	20	430		550	74	135	27
5..	181	55	27	1500		1900	59	133	21
6..	1010	661	1800	1100		380	57	121	19
7..	955	294	758	1060		240	56	122	18
8..	755	185	377	1140		190	160	220	108
9..	725	245	460	1060		150	1060	520	1840
10..	725	183	358	815		110	3950	1080	10900
11..	815	112	246	545		75	5080	550	7540
12..	785	85	180	340		45	4870	224	2940
13..	695	68	128	232		30	5530	292	4360
14..	635	76	130	180		25	6870	310	5750
15..	605	107	175	148		20	6670	165	2970
16..	490	118	156	134		18	5930	92	1470
17..	165	105	103	120		16	4730	88	1120
18..	297	94	75	108		14	3990	152	1640
19..	241	95	62	108		16	2720	136	999
20..	205	108	60	114		15	2320	212	1330
21..	330	141	126	96		13	2370	241	1540
22..	605	215	351	84		11	2130	238	1370
23..	545	190	280	200		95	2000	220	1190
24..	695	326	612	297		140	1820	242	1190
25..	635	198	339	172		40	1770	236	1130
26..	490	172	228	127		25	1860	306	1540
27..	340	117	107	108		20	1260	232	789
28..	259	72	50	90		18	725	216	423
29..	232	82	51	78		16	635	222	381
30..	250	87	59	67		14	725	249	487
31..	--	--	--	57		14	--	--	--
Total	14814	--	7423	11162		4333	69621	--	53162
Day	JULY			AUGUST			SEPTEMBER		
	Suspended sediment			Suspended sediment			Suspended sediment		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	785	234	496	885	197	471	61	53	9
2..	665	216	388	575	111	172	54	54	8
3..	465	168	211	955	182	469	52	46	6
4..	340	121	111	1260	180	612	52	52	7
5..	278	127	95	885	147	351	60	50	8
6..	250	160	108	665	143	257	59	63	10
7..	415	229	256	725	266	521	53	66	9
8..	415	227	254	415	148	166	47	54	7
9..	415	263	295	390	119	125	45	40	5
10..	490	361	478	490	154	204	112	116	35
11..	1990	951	5110	2490	416	3170	196	152	80
12..	2420	580	3790	3630	311	3050	141	100	38
13..	1680	308	1400	3100	165	1380	127	73	25
14..	1770	302	1440	2780	134	1010	114	65	20
15..	2520	355	2420	3330	126	1130	96	68	18
16..	3630	582	5700	3450	129	1170	78	70	15
17..	3990	290	3120	2720	127	933	78	76	16
18..	3390	148	1350	1340	136	492	327	105	93
19..	2420	155	1010	850	124	284	490	131	173
20..	1860	158	793	635	108	185	490	127	168
21..	1380	143	533	415	94	105	635	144	247
22..	990	140	374	259	92	64	665	182	327
23..	695	129	242	188	87	44	465	120	151
24..	490	132	175	148	87	35	278	81	61
25..	643	239	523	127	79	27	214	70	40
26..	1900	698	2450	114	71	22	164	62	27
27..	885	342	817	102	74	20	120	57	18
28..	850	269	617	102	71	20	102	49	13
29..	920	210	522	96	72	19	84	32	7
30..	920	193	479	84	74	17	75	38	8
31..	920	211	524	74	62	12	--	--	--
Total	40181	--	36081	33279	--	16537	5534	--	1649
Total discharge for year (cfs-days).....									305727
Total load for year (tons).....									188543

S Computed by subdividing day.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1958 to September 1959

Suspended sediment, water year October 1958 to September 1959										
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..	69	19	4	33	4	T	580	44	69	
2..	62	15	2	34	6	1	490	36	48	
3..	59	13	2	34	7	1	365	35	34	
4..	59	19	3	33	9	1	415	28	31	
5..	58	31	5	33	16	1	665	65	117	
6..	54	16	2	32	11	1	605	80	131	
7..	50	15	2	30	11	1	500	34	46	
8..	47	30	4	30	8	1	430	18	21	
9..	47	25	3	31	4	T	380	13	13	
10..	70	36	7	33	5	T	340	12	11	
11..	114	38	12	34	11	1	300	12	10	
12..	96	27	7	37	8	1	270	10	7	
13..	72	26	5	35	12	1	250	10	7	
14..	59	21	3	35	20	2	220	15	9	
15..	55	30	4	82	45	B	200	16	9	
16..	54	31	4	148	65	A	25	190	15	8
17..	50	31	4	1750	757	S	4710	185	16	8
18..	42	26	3	3450	500	S	4520	180	14	7
19..	38	16	2	3750	157	1590	172	15	7	7
20..	36	14	1	3100	103	862	172	16	7	7
21..	36	19	2	1950	80	421	172	15	7	7
22..	37	29	3	1340	67	242	164	13	6	6
23..	40	38	4	990	56	150	156	14	6	6
24..	42	24	3	665	44	79	164	11	5	5
25..	39	13	1	603	58	S	121	172	9	4
26..	38	16	2	2520	344	S	2390	172	6	3
27..	37	23	2	2470	197	1310	164	7	3	3
28..	37	16	2	1300	97	340	164	4	2	2
29..	35	11	1	990	74	198	164	3	1	1
30..	34	12	1	740	53	106	156	3	1	1
31..	33	10	1	--	--	--	148	4	2	2
Total	1599	--	101	26312	--	17085	8705	--	640	640
	JANUARY			FEBRUARY			MARCH			
1..	502	97	S	215	3200	109	942	1300	89	312
2..	1640	396	B	1750	2200	81	481	1220	100	329
3..	1420	280	B	1100	1860	77	387	1140	64	197
4..	1100	154	457	2180	77	453	1060	58	166	166
5..	850	114	262	2040	104	573	920	50	124	124
6..	690	62	116	1380	51	190	1590	220	S	1080
7..	530	47	67	990	36	96	2040	586	3230	3230
8..	450	34	41	815	32	70	1420	219	S	854
9..	370	26	26	940	46	S	166	2320	332	2080
10..	310	19	16	8810	576	S	15400	2420	223	1460
11..	280	16	12	12200	936	30800	1950	117	616	616
12..	260	12	8	10300	788	21900	1380	72	268	268
13..	241	8	5	8920	632	15200	1220	58	191	191
14..	241	8	5	7520	417	8470	1140	55	169	169
15..	415	49	55	6960	343	6440	1420	125	S	1070
16..	490	49	65	5710	357	5500	1680	288	1310	1310
17..	415	37	41	3580	216	2090	1180	132	420	420
18..	350	25	24	2400	144	933	1020	89	245	245
19..	545	32	47	1820	117	575	955	78	201	201
20..	545	57	84	1340	83	300	850	81	186	186
21..	2540	70	480	990	50	134	725	88	172	172
22..	4870	100	1310	775	40	84	545	86	126	126
23..	4700	202	2560	2080	220	S	1500	440	78	93
24..	4400	149	1770	1820	316	1550	390	75	79	79
25..	4100	78	863	1180	182	580	365	89	88	88
26..	3800	68	698	1020	116	319	535	--	E	440
27..	3600	57	554	1100	95	282	1460	762	S	3000
28..	3400	47	431	1180	88	280	1100	264	S	813
29..	3700	43	430	--	--	--	635	116	199	199
30..	4800	60	778	--	--	--	605	85	139	139
31..	4800	131	1700	--	--	--	635	87	149	149
Total	56354	--	15970	95310	--	115695	35660	--	19806	19806

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.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1958 to September 1959--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..	818	--	900	8600	198	4600	365	285	281
2..	2520	800	5400	5970	120	1930	257	269	187
3..	1860	440	2210	3930	96	1020	192	205	106
4..	1260	228	776	2000	135	729	153	169	70
5..	955	141	364	1100	165	490	125	150	51
6..	850	144	330	785	166	352	112	129	39
7..	755	144	294	605	150	245	99	124	33
8..	605	141	230	440	137	163	87	138	32
9..	605	135	220	340	112	103	81	114	25
10..	665	120	215	302	91	74	76	97	20
11..	575	65	101	302	103	84	70	123	23
12..	575	52	81	465	193	242	68	118	22
13..	545	55	81	575	148	230	62	122	20
14..	465	67	84	605	127	207	57	119	18
15..	365	96	95	635	136	233	54	111	16
16..	290	98	77	635	108	185	54	79	12
17..	236	102	65	575	67	104	60	96	16
18..	208	83	47	465	72	90	58	84	13
19..	200	61	33	365	82	81	51	72	10
20..	415	100	112	279	100	75	45	70	8
21..	465	73	92	315	131	111	41	71	8
22..	365	73	72	503	199	371	43	81	9
23..	302	73	60	2620	962	6980	56	96	14
24..	257	81	56	2620	522	3690	60	105	17
25..	227	76	46	1300	384	1350	56	110	17
26..	208	63	35	885	426	1020	1800	1710	10200
27..	2260	593	4400	955	620	1600	1640	920	4220
28..	6690	880	15900	575	311	483	850	530	1220
29..	9880	643	17200	390	244	257	545	460	677
30..	9880	403	10800	390	226	238	725	770	1510
31..	--	--	--	850	263	604	--	--	--
Total	45301	--	60376	40376	--	27941	7942	--	18894
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..	785	910	1930	29	89	7	20	94	5
2..	725	830	1620	28	88	7	24	81	5
3..	465	600	753	35	99	9	59	99	16
4..	257	386	268	37	100	10	52	86	12
5..	176	259	123	35	84	8	33	76	7
6..	125	203	68	31	98	8	39	98	10
7..	93	177	44	28	85	6	48	93	12
8..	70	142	27	25	80	5	38	95	10
9..	55	134	20	22	85	5	31	110	9
10..	47	134	17	22	83	5	24	111	7
11..	44	166	20	22	89	5	19	114	6
12..	41	106	12	21	82	5	16	93	4
13..	37	118	12	19	89	4	14	65	2
14..	34	116	11	18	84	4	13	83	3
15..	31	107	9	17	71	3	12	89	3
16..	30	115	9	18	81	4	12	79	2
17..	28	129	10	36	94	9	15	55	2
18..	46	158	22	81	96	21	16	42	2
19..	125	243	82	64	101	17	16	68	3
20..	105	176	50	48	100	13	14	65	2
21..	70	125	24	35	93	9	14	60	2
22..	48	133	17	27	96	7	20	82	4
23..	157	211	138	24	108	7	27	95	7
24..	815	741	1630	22	114	7	21	87	5
25..	390	256	289	21	93	5	19	96	5
26..	168	204	92	21	97	5	17	107	5
27..	87	184	43	20	88	5	24	117	8
28..	60	133	22	18	98	5	37	117	12
29..	47	126	16	19	94	5	40	96	10
30..	39	112	12	20	89	5	33	102	9
31..	33	100	9	18	82	4	--	--	--
Total	5233	--	7399	881	--	219	767	--	189
Total discharge for year (cfs-days).....									324440
Total load for year (tons).....									284315

E Estimated.

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1959 to September 1960

Day	Mean discharge (cfs)	OCTOBER		NOVEMBER			DECEMBER		
		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..	24	95	6	46	69	8	81	18	4
2..	19	96	5	45	47	6	81	11	2
3..	18	90	4	43	41	5	81	9	2
4..	17	98	4	185	136	97	93	7	2
5..	19	100	5	515	233	324	118	9	3
6..	91	180	A 45	465	191	240	160	10	4
7..	200	170	B 90	290	106	83	208	14	8
8..	208	140	79	268	80	58	227	13	8
9..	118	132	42	227	57	35	246	15	10
10..	87	110	26	168	55	25	236	14	9
11..	285	340	S 410	125	65	22	300	29	S 34
12..	785	1140	2420	105	46	13	1750	428	S 2390
13..	490	332	439	99	47	12	3050	580	4780
14..	390	234	246	985	232	759	2670	240	1730
15..	279	274	206	1540	431	1790	1820	135	663
16..	176	228	108	990	164	438	1590	116	498
17..	118	196	62	755	110	224	1460	107	422
18..	81	112	24	635	102	175	1220	84	277
19..	60	63	10	545	73	107	885	64	153
20..	49	62	8	390	56	59	605	49	80
21..	42	78	9	246	47	31	415	37	41
22..	37	75	7	184	40	20	302	27	22
23..	35	81	8	153	35	14	227	21	13
24..	33	78	7	139	38	14	200	16	9
25..	35	40	4	132	32	11	176	16	8
26..	34	21	2	118	21	7	168	12	5
27..	39	16	2	99	19	5	439	137	S 224
28..	43	15	2	93	18	4	1180	318	1010
29..	45	15	2	93	20	5	1420	214	820
30..	47	21	3	86	21	5	1300	136	477
31..	46	61	8	--	--	--	815	90	198
Total	3950	--	4293	9764	--	4596	23523	--	13906
Day	Mean discharge (cfs)	JANUARY		FEBRUARY			MARCH		
		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..	665	50	90	755	55	112	120	11	4
2..	665	44	79	665	39	70	110	5	1
3..	1200	145	S 542	215	30	42	105	10	3
4..	1100	141	419	415	26	29	100	24	6
5..	665	72	129	390	60	S 69	97	19	5
6..	500	42	57	1920	851	S 4700	94	19	5
7..	300	55	44	2520	530	3610	92	11	3
8..	260	37	26	1680	212	962	90	9	2
9..	235	34	22	1540	144	599	88	6	1
10..	220	25	15	3440	353	S 3620	86	6	1
11..	192	21	11	4870	505	6640	85	4	1
12..	1090	686	S 3200	4470	326	3930	84	5	1
13..	3160	855	7290	3510	158	1500	84	5	1
14..	2830	320	2440	2320	129	808	84	5	1
15..	2940	251	1990	1500	108	437	84	4	1
16..	3100	214	1790	1100	83	246	84	3	1
17..	2720	122	896	695	61	114	88	4	1
18..	2270	83	509	465	44	55	92	5	1
19..	1900	76	390	315	32	27	105	4	1
20..	1460	65	256	270	20	14	120	9	3
21..	1100	52	154	220	21	12	140	11	4
22..	950	33	85	200	20	11	170	15	7
23..	840	20	45	180	11	5	200	16	9
24..	740	20	40	165	4	2	280	15	11
25..	640	19	33	155	12	5	290	17	13
26..	605	15	24	150	33	13	320	14	12
27..	575	20	31	155	33	14	865	128	S 644
28..	1060	87	249	140	13	5	3100	1140	9540
29..	1260	371	1260	125	15	5	3810	540	5550
30..	1260	200	680	--	--	--	3870	254	2650
31..	1220	85	280	--	--	--	3630	172	1680
Total	37822	--	23076	34845	--	27656	18567	--	20163

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820, ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1959 to September 1960--Continued

Day	APRIL			MAY			JUNE		
	Suspended sediment			Suspended sediment			Suspended sediment		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	3050	120	988	132	42	15	1260	295	1000
2..	2320	93	582	112	35	10	850	278	638
3..	1460	104	410	93	50	12	755	306	624
4..	990	105	281	87	46	11	545	282	415
5..	695	91	171	81	55	12	415	238	267
6..	515	70	97	76	63	13	340	201	184
7..	440	48	57	76	73	15	218	211	124
8..	365	46	45	70	28	5	160	166	72
9..	302	41	33	87	22	5	125	140	47
10..	246	30	20	125	59	20	99	155	41
11..	208	26	15	125	28	9	110	114	34
12..	192	34	18	112	15	4	575	675	1120
13..	168	45	20	105	22	6	575	569	883
14..	153	51	21	112	41	12	2280	698	4540
15..	146	43	17	112	54	16	1950	640	3370
16..	256	127	117	99	41	11	815	340	748
17..	1060	690	1970	93	35	9	575	273	424
18..	785	524	1110	118	36	11	440	258	306
19..	390	180	190	112	44	13	302	212	173
20..	365	102	100	125	66	22	208	169	95
21..	315	131	111	246	83	55	168	153	69
22..	257	122	85	236	95	60	448	1380	2210
23..	200	91	49	184	85	42	315	790	672
24..	168	82	37	168	81	37	176	270	128
25..	153	92	38	139	85	32	118	174	55
26..	139	88	33	125	72	24	87	142	33
27..	118	73	23	306	130	178	70	124	23
28..	105	61	17	1100	674	2000	62	118	20
29..	93	60	15	885	420	1000	60	116	19
30..	105	49	14	815	556	1360	55	110	16
31..	--	--	--	1820	616	3030	--	--	--
Total	15759	--	6684	8076	--	8049	14156	--	18350
Day	JULY			AUGUST			SEPTEMBER		
	Suspended sediment			Suspended sediment			Suspended sediment		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	50	95	13	31	123	10	37	111	11
2..	44	83	10	27	105	8	29	112	9
3..	55	109	16	27	128	9	22	97	6
4..	76	141	29	26	102	7	20	95	5
5..	76	95	19	26	84	6	16	93	4
6..	53	116	16	29	130	10	13	75	3
7..	45	114	14	26	122	8	13	70	2
8..	46	111	14	26	108	8	12	83	3
9..	44	95	11	25	115	8	17	88	4
10..	37	91	9	25	100	7	16	92	4
11..	33	116	10	25	101	7	14	85	3
12..	31	135	11	24	89	6	14	72	3
13..	33	138	12	27	94	7	12	67	2
14..	207	480	270	28	92	7	10	70	2
15..	415	512	574	24	105	7	12	81	3
16..	227	244	150	22	109	6	14	77	3
17..	208	228	128	19	115	6	14	83	3
18..	192	233	121	19	106	5	14	96	4
19..	139	176	66	21	109	6	17	110	5
20..	99	165	44	29	123	10	19	96	5
21..	68	138	25	46	145	18	22	98	6
22..	51	117	16	41	111	12	30	98	8
23..	39	114	12	31	102	8	24	85	6
24..	43	--	30	24	106	7	19	103	5
25..	236	1100	700	21	108	6	17	100	4
26..	105	420	119	19	95	5	14	88	3
27..	76	235	48	19	96	5	13	98	3
28..	81	183	40	17	97	4	15	104	4
29..	61	151	25	16	95	4	15	81	3
30..	45	150	18	17	95	4	14	87	3
31..	37	160	16	24	97	6	--	--	--
Total	2952	--	2586	781	--	227	518	--	129

Total discharge for year (cfs-days)..... 170713  
 Total load for year (tons)..... 129715

E Estimated.

A Computed from partly estimated-concentration graph.

S Computed by subdividing day.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--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..	14	57	2	15	36	1			
2..	14	66	2	15	13	1	17	60	3
3..	14	78	3	15	16	1	17	25	1
4..	19	97	5	16	21	1	15	8	T
5..	21	96	5	18	21	1	15	10	T
6..	20	92	5	17	24	1	15	8	T
7..	17	76	3	17	26	1	15	8	T
8..	17	67	3	17	13	1	16	11	T
9..	16	63	3	17	17	1	17	27	1
10..	15	66	3	17	16	1	17	11	1
11..	16	73	3	18	8	T	17	4	T
12..	16	80	3	18	14	1	18	5	T
13..	16	97	4	23	15	1	17	1	T
14..	16	99	4	20	26	1	16	7	T
15..	14	72	3	20	46	2	17	4	T
16..	12	73	2	25	28	2	17	4	T
17..	14	82	3	30	51	4	18	4	T
18..	14	54	2	30	37	3	18	4	T
19..	13	50	2	27	11	1	18	5	T
20..	12	37	1	20	19	1	21	7	T
21..	13	38	1	16	25	1	23	7	T
22..	14	33	1	15	23	1	22	1	T
23..	14	43	2	15	26	1	24	1	T
24..	14	45	2	20	27	1	22	8	T
25..	14	40	2	20	16	1	17	3	T
26..	17	43	2	18	25	1	18	4	T
27..	18	34	2	15	37	1	17	5	T
28..	21	44	2	15	63	2	18	5	T
29..	25	43	3	15	54	2	19	4	T
30..	20	58	3	16	14	1	20	5	T
31..	17	62	3	--	--	--	18	4	T
Total	497	--	84	560	--	38	556	--	14
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..	18	2	T	22	10	1	1260		210
2..	18	3	T	23	10	1	1190		140
3..	18	6	T	25	11	1	1160		120
4..	18	5	T	26	9	1	980		90
5..	20	6	T	26	13	1	980		90
6..	20	5	T	26	11	1	1080		130
7..	20	9	T	26	6	T	1380		420
8..	22	2	T	27	--	1	1220		180
9..	25	1	T	29	--	1	1340		160
10..	28	5	T	31	--	1	1380		120
11..	30	4	T	31	--	1	1220		90
12..	32	4	T	31	--	1	1080		75
13..	32	3	T	31	--	1	2200		3700
14..	29	2	T	34	--	1	3690		8500
15..	29	6	T	42	--	1	3690		2900
16..	30	20	2	52	--	1	3160		850
17..	33	6	1	56	--	2	2370		390
18..	34	2	T	62	--	2	1900		270
19..	36	4	T	270	--	95	2320		1100
20..	35	6	1	325	--	60	2940		1800
21..	33	3	T	173	--	20	3050		1300
22..	31	5	T	132	--	13	3510		1100
23..	29	14	1	125	--	12	3930		700
24..	27	7	1	132	--	11	3810		460
25..	25	4	T	195	--	35	3450		320
26..	24	3	T	1100	--	1200	2830		210
27..	22	5	T	1340	--	850	2180		150
28..	21	6	T	1380	--	350	1620		130
29..	21	7	T	--	--	--	1190		85
30..	21	6	T	--	--	--	840		60
31..	21	8	T	--	--	--	635		45
Total	802	--	13	5772	--	2665	63585		25895

T Less than 0.5 ton.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820, ST. MARYS RIVER NEAR FORT WAYNE, IND.--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..	485		30	3050	--	700	60	20	3
2..	375		25	1460	80	315	59	16	2
3..	312		18	910	75	184	54	16	2
4..	280		15	635	69	118	50	17	2
5..	250		14	485	60	78	44	17	2
6..	230		12	400	49	53	41	22	2
7..	210		12	350	42	40	40	24	2
8..	191		11	325	48	42	42	26	3
9..	182		11	1630	504	2950	50	28	4
10..	286		75	2940	434	3440	82	33	7
11..	1540		2300	1950	228	844	118	33	10
12..	1460		800	980	94	249	182	47	23
13..	2040		1900	735	60	119	350	87	82
14..	2080		1000	665	46	82	425	200	230
15..	1700		350	605	44	72	290	85	66
16..	2270		1400	485	34	44	220	56	33
17..	3270		4000	350	32	30	140	44	17
18..	3870		2400	290	31	24	200	46	25
19..	3990		1200	290	31	24	350	74	70
20..	3870		850	280	26	20	515	128	178
21..	3450		600	250	27	18	425	85	98
22..	3390		1100	220	23	14	240	47	30
23..	4290		2300	191	24	12	156	45	19
24..	4470		1200	164	27	12	112	37	11
25..	4730		900	148	36	14	88	30	7
26..	6070		1100	140	37	14	77	32	7
27..	7820		1800	125	22	7	68	52	10
28..	7970		2100	105	27	8	60	41	7
29..	6710		1800	82	25	6	53	28	4
30..	4870		1200	72	31	6	47	24	3
31..	--		--	64	24	4	--	--	--
Total	82661		30523	20376	--	9543	4638	--	959
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..	41	26	3	312	195	164	35	72	7
2..	37	27	3	350	217	205	280	128	S 121
3..	34	24	2	350	235	222	261	128	90
4..	33	26	2	260	158	111	118	94	30
5..	36	33	3	435	160	220	77	84	17
6..	48	34	4	1080	340	1000	64	70	12
7..	50	33	4	635	204	350	250	--	150
8..	46	30	4	325	141	124	156	184	78
9..	40	32	3	220	95	56	88	107	25
10..	36	30	3	210	98	56	58	78	12
11..	37	32	3	173	103	48	43	56	6
12..	42	31	4	125	54	18	66	90	A 16
13..	43	26	3	88	44	10	62	92	15
14..	229	--	160	71	51	10	41	67	7
15..	840	440	A 1000	59	54	9	34	59	5
16..	312	214	180	55	61	9	29	48	4
17..	148	130	52	54	34	5	26	41	3
18..	93	107	27	52	35	5	23	46	3
19..	77	44	9	57	37	6	21	46	3
20..	72	6	1	132	106	38	21	54	3
21..	99	31	8	93	63	16	22	49	3
22..	125	20	7	70	54	10	23	57	4
23..	112	19	6	58	51	8	22	56	3
24..	202	30	S 18	48	41	5	25	58	4
25..	575	228	S 364	375	400	A 400	70	104	S 21
26..	350	211	199	635	290	A 500	148	101	40
27..	164	126	56	220	75	75	125	76	26
28..	182	121	S 91	112	86	26	82	70	15
29..	1190	644	2070	71	64	12	58	55	9
30..	770	668	973	50	54	7	54	70	10
31..	375	285	288	39	76	8	--	--	--
Total	6438	--	5550	6814	--	3733	2382	--	742
Total discharge for year (cfs-days).....									195081
Total load for year (tons).....									79759

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.



## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1961 to September 1962  
(Where no concentrations are reported, loads are estimated)

Day	Mean discharge (cfs)	OCTOBER		NOVEMBER			DECEMBER		
		Suspended sediment		Suspended sediment			Suspended sediment		
		Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	70	81	15	54	24	3	105	12	3
2..	72	56	11	50	20	3	93	13	3
3..	61	48	8	47	25	3	82	14	3
4..	51	53	7	47	20	2	77	14	3
5..	45	51	6	48	13	2	99	34	9
6..	40	46	5	48	14	2	99	18	5
7..	38	40	4	45	15	2	88	14	3
8..	36	40	4	41	12	1	72	12	2
9..	36	48	5	37	13	1	62	9	2
10..	35	52	5	34	11	1	60	10	2
11..	35	58	5	33	11	1	60	7	1
12..	35	52	5	33	10	1	59	8	1
13..	38	59	6	34	14	1	58	9	1
14..	44	54	6	39	19	2	58	8	1
15..	48	33	4	72	18	3	57	10	2
16..	41	28	3	773	450	A 450	56	8	1
17..	37	38	4	1500	290	A 1200	66	8	1
18..	37	44	4	700	77	146	77	9	2
19..	40	49	5	325	54	47	82	9	2
20..	42	36	4	240	34	22	77	7	1
21..	44	34	4	220	26	15	72	8	2
22..	45	37	4	210	24	14	72	9	2
23..	49	41	5	452	61	S 84	77	8	2
24..	52	40	6	735	81	161	77	8	2
25..	58	39	6	515	55	76	70	7	1
26..	99	35	9	300	36	29	66	6	1
27..	93	32	8	230	25	14	64	8	1
28..	70	25	5	173	18	8	62	8	1
29..	58	23	4	140	9	3	60	11	1
30..	54	32	5	118	14	4	59	8	1
31..	55	32	5	--	--	--	58	9	1
Total	1558	--	177	7293	--	2303	2224	--	64
Day	Mean discharge (cfs)	JANUARY		FEBRUARY			MARCH		
		Suspended sediment		Suspended sediment			Suspended sediment		
		Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	58	10	2	3600	99	962	3870	120	1250
2..	58	9	1	3000	78	632	2780	88	660
3..	58	9	1	1740	56	263	2880	92	715
4..	62	10	2	1500	61	S 272	2370	76	486
5..	99	12	3	2830	476	3640	1620	47	206
6..	1020	109	S 400	2320	261	S 1720	1120	23	70
7..	2830	278	2120	1380	73	272	980	60	A 160
8..	2320	148	927	870	47	110	1220	85	A 280
9..	1120	52	157	700	47	69	1860	146	S 895
10..	700	30	57	560	41	62	3050	393	3240
11..	600	27	44	410	30	33	2620	220	1560
12..	500	26	35	320	24	21	3600	360	A 3500
13..	450	22	27	250	24	16	3360	390	A 3500
14..	400	21	23	250	31	21	2370	160	1020
15..	1200	56	S 218	240	28	18	2180	126	742
16..	2370	96	614	250	19	13	2000	124	670
17..	2000	113	610	240	23	15	1500	96	389
18..	1340	77	278	240	20	13	1160	56	175
19..	1120	84	254	280	7	5	1020	55	151
20..	1080	91	265	250	13	9	1020	74	204
21..	1080	83	242	270	17	12	2290	373	S 2870
22..	1220	77	254	350	16	15	3750	644	6520
23..	1820	62	305	450	26	32	3510	415	3930
24..	1420	90	345	480	40	52	2670	128	923
25..	1080	57	166	545	47	69	2320	94	589
26..	2510	124	S 1120	1660	190	A 850	1860	80	402
27..	5400	462	6740	4350	480	A 5600	1380	76	283
28..	5870	543	8610	4530	262	3200	1050	73	207
29..	5970	270	4350	--	--	--	805	78	170
30..	5400	194	2830	--	--	--	665	80	144
31..	4800	156	2020	--	--	--	515	73	102
Total	55955	--	33020	33865	--	18016	63395	--	36013

S Computed by subdividing day.

A Computed from partly estimated concentration graph.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1961 to September 1962--Continued  
(Where no concentrations are reported, loads are estimated)

(Where concentrations are reported, loads are estimated)									
Day	Mean discharge (cfs)	APRIL		Mean discharge (cfs)	MAY		Mean discharge (cfs)	JUNE	
		Suspended sediment			Suspended sediment			Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	400	63	68	68	--	6	52		4
2..	325	53	46	142	--	20	57		4
3..	260	45	32	700	--	390	82		8
4..	220	--	50	485	--	200	64		5
5..	210	--	45	290	--	80	60		5
6..	210	--	45	230	--	55	233		55
7..	210	--	45	200	--	40	350		120
8..	191	--	40	191	--	40	220		50
9..	230	--	55	191	--	40	140		20
10..	210	--	45	191	--	40	112		15
11..	164	--	30	164	--	30	105		13
12..	148	--	25	156	--	25	131		19
13..	164	--	30	148	--	25	485		200
14..	182	--	35	148	--	25	280		75
15..	156	--	25	125	--	18	156		25
16..	125	--	18	112	67	20	105		13
17..	112	--	15	93	61	15	82		8
18..	105	--	13	84	63	14	68		6
19..	99	--	12	72	68	13	60		5
20..	88	--	9	68	73	13	55		4
21..	82	--	8	66	--	6	49		3
22..	77	--	7	71	--	6	43		2
23..	77	--	7	70	--	6	39		2
24..	77	--	7	65	--	5	37		2
25..	77	--	7	54	--	4	37		2
26..	69	--	6	52	--	4	42		2
27..	64	--	5	60	--	5	35		2
28..	62	--	5	67	--	6	30		1
29..	62	--	5	64	--	5	27		1
30..	62	--	5	60	--	5	24		1
31..	--	--	--	54	--	4	--		--
Total	4518	--	745	4539	--	1165	3260		672
JULY				AUGUST			SEPTEMBER		
1..	33		2	26		1	20		1
2..	72		6	21		1	19		1
3..	67		6	19		1	19		1
4..	45		3	17		1	24		1
5..	40		2	16		1	26		1
6..	45		3	14		1	26		1
7..	38		2	18		1	22		1
8..	34		2	23		1	18		1
9..	34		2	17		1	18		1
10..	36		2	16		1	17		1
11..	47		3	14		1	16		1
12..	41		2	14		1	16		1
13..	34		2	13		1	16		1
14..	30		1	12		1	20		1
15..	26		1	14		1	40		2
16..	24		1	14		1	58		4
17..	22		1	14		1	69		6
18..	23		1	14		1	140		20
19..	23		1	14		1	132		19
20..	24		1	12		1	99		12
21..	29		1	11		1	67		6
22..	70		6	11		1	47		3
23..	82		8	11		1	34		2
24..	53		4	12		1	26		1
25..	37		2	15		1	24		1
26..	29		1	23		1	22		1
27..	27		1	42		2	21		1
28..	34		2	70		6	19		1
29..	42		2	45		3	17		1
30..	39		2	30		1	15		1
31..	32		2	22		1	--		--
Total	1212		75	614		25	1107		92
Total discharge for year (cfs-days).....									
									179540
Total load for year (tons).....									
									92367

T Less than 0.5 ton.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1962 to September 1963  
(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..	14		1	22		1	30		2
2..	13		7	23		1	28		2
3..	14		1	24		1	28		2
4..	16		1	25		1	27		1
5..	18		1	25		1	27		1
6..	17		1	26		1	27		1
7..	17		1	26		1	28		2
8..	17		1	24		1	27		1
9..	16		1	23		1	26		1
10..	17		1	24		1	25		1
11..	24		1	24		1	25		1
12..	22		1	26		1	25		1
13..	18		1	26		1	25		1
14..	17		1	28		2	25		1
15..	19		1	38		3	25		1
16..	35		2	77		8	25		1
17..	27		1	82		9	25		1
18..	23		1	77		8	25		1
19..	22		1	72		7	25		1
20..	23		1	66		6	25		1
21..	25		1	72		7	26		1
22..	25		1	105		13	29		2
23..	24		1	99		12	31		2
24..	26		1	82		9	32		2
25..	26		1	66		6	32		2
26..	26		1	49		4	36		2
27..	27		1	38		2	38		3
28..	26		1	35		2	40		3
29..	24		1	32		2	45		4
30..	23		1	31		1	45		4
31..	22		1	--		--	42		3
Total	663		32	1367		114	919		52
	JANUARY			FEBRUARY			MARCH		
1..	38		3	25		1	50		4
2..	35		2	25		1	50		4
3..	32		2	25		1	50		4
4..	30		2	25		1	1000		490
5..	28		2	26		1	4500		5600
6..	27		1	30		2	6700		11000
7..	26		1	33		2	7200		12000
8..	26		1	42		3	7380		12000
9..	28		2	70		7	6580		11000
10..	29		2	95		11	5240		7200
11..	30		2	120		16	3810		4400
12..	32		2	140		20	2220		1800
13..	34		2	145		20	1820		1300
14..	37		2	135		20	2130		1700
15..	41		3	110		14	1740		1200
16..	45		4	95		11	1540		1000
17..	50		4	80		8	1660		1100
18..	70		7	70		7	1740		1200
19..	100		12	75		8	1500		950
20..	120		16	125		17	1900		1400
21..	90		10	125		17	1700		1200
22..	66		6	115		15	1380		800
23..	55		5	108		14	1260		700
24..	47		4	108		14	1260		700
25..	41		3	112		14	1160		600
26..	37		2	105		13	945		450
27..	32		2	70		7	910		420
28..	29		2	52		4	840		370
29..	27		1	--		--	635		240
30..	26		1	--		--	545		180
31..	25		1	--		--	485		150
Total	1333		109	2286		269	69930		81162

T Less than 0.5 ton.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1962 to September 1963--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..	575		200	290		65	112		14
2..	805		350	230		45	210		40
3..	605		220	210		40	220		40
4..	485		150	220		40	173		30
5..	455		140	210		45	198		35
6..	425		120	200		35	400		110
7..	425		120	173		30	280		60
8..	400		110	156		25	270		60
9..	325		80	140		20	368		95
10..	270		60	125		17	840		370
11..	220		45	118		16	665		250
12..	182		30	105		13	455		140
13..	164		25	99		12	325		80
14..	148		25	105		13	230		45
15..	132		19	105		13	164		25
16..	118		16	99		12	118		16
17..	141		20	93		11	93		11
18..	352		90	99		12	77		8
19..	314		75	105		13	62		6
20..	605		220	112		14	54		4
21..	515		170	112		14	48		4
22..	350		90	99		12	41		3
23..	425		120	93		11	35		2
24..	700		280	82		9	30		2
25..	515		170	72		7	28		2
26..	455		140	66		6	26		1
27..	485		150	62		6	26		1
28..	455		140	67		6	25		1
29..	375		95	88		10	25		1
30..	325		80	148		25	23		1
31..	--		--	148		--	--		--
Total	11746		3550	4031		622	5621		1457
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..	23		1	33		2	11	13	T
2..	32		2	26		1	11	13	T
3..	38		3	22		1	10	11	T
4..	32		2	22		1	10	11	T
5..	25		1	24		1	10	11	T
6..	22		1	28		2	10	11	T
7..	19		1	26		1	11	13	T
8..	18		1	22		1	13	13	T
9..	21		1	20		1	11	13	T
10..	20		1	18		1	10	11	T
11..	18		1	17		1	10	11	T
12..	17		1	16		1	12	12	T
13..	17		1	18		1	17	--	1
14..	22		1	21		1	22	--	1
15..	41		3	20		1	16	--	1
16..	72		7	19		1	14	--	1
17..	58		5	18		1	13	13	T
18..	55		5	17		1	12	12	T
19..	56		5	17		1	11	13	T
20..	204		40	17		1	10	11	T
21..	545		180	19		1	14	--	1
22..	290		65	18		1	18	--	1
23..	132		19	18		1	15	--	1
24..	82		9	16		1	12	12	T
25..	64		6	16		1	11	13	T
26..	54		4	14		1	10	11	T
27..	44		3	14		1	10	11	T
28..	37		2	16		1	10	11	T
29..	34		2	16		1	11	11	T
30..	37		2	14		1	11	11	T
31..	51		4	13	13	T	--	--	--
Total	2180		379	595		32	366	--	15
Total discharge for year (cfs-days).....									
Total load for year (tons).....									
									101037
									87793

T Less than 0.5 ton.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1963 to September 1964  
(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..	11	13	T	11	13	T	17		1
2..	9.2	12	T	12	13	T	16		1
3..	8.4	9	T	15	--	1	16		1
4..	8.0	9	T	15	--	1	16		1
5..	8.0	9	T	17	--	1	16		1
6..	8.4	9	T	21	--	1	15		1
7..	7.6	9	T	22	--	1	14		1
8..	8.0	9	T	19	--	1	16		1
9..	7.6	9	T	18	--	1	16		1
10..	7.2	9	T	17	--	1	16		1
11..	6.9	9	T	16	--	1	16		1
12..	6.6	8	T	16	--	1	17		1
13..	6.9	9	T	15	--	1	17		1
14..	7.2	9	T	15	--	1	17		1
15..	6.6	9	T	16	--	1	16		1
16..	6.9	9	T	16	--	1	16		1
17..	6.6	8	T	16	--	1	15		1
18..	6.6	8	T	17	--	1	14		1
19..	9.2	12	T	16	--	1	14		1
20..	7.2	9	T	16	--	1	14		1
21..	7.2	9	T	16	--	1	14		1
22..	8.0	9	T	17	--	1	15		1
23..	7.6	9	T	22	--	1	17		1
24..	10	9	T	31	--	2	19		1
25..	12	13	T	26	--	1	17		1
26..	8.0	9	T	24	--	1	24		1
27..	6.6	8	T	22	--	1	26		1
28..	7.2	9	T	18	--	1	21		1
29..	14	--	1	17	--	1	17		1
30..	12	13	T	17	--	1	17		1
31..	10	9	T	--	--	--	17		1
Total	256.7	--	8	536	--	30	518		31
Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	20		1	88		10	45		3
2..	23		1	77		8	145		20
3..	25		1	66		6	350		90
4..	24		1	57		5	735		300
5..	22		1	55		5	1780		1200
6..	22		1	52		4	1620		1100
7..	20		1	49		4	875		380
8..	19		1	48		4	700		280
9..	28		2	46		4	1510		1000
10..	42		3	45		3	2420		2100
11..	39		3	44		3	2520		2200
12..	35		2	42		3	2220		1800
13..	34		2	41		3	2420		2100
14..	30		2	40		3	3570		3800
15..	27		1	39		3	4230		5100
16..	26		1	37		2	4230		5100
17..	26		1	37		2	3630		4000
18..	27		1	36		2	2420		2100
19..	30		2	36		2	1460		900
20..	40		3	36		2	1080		550
21..	65		6	36		2	945		440
22..	118		16	37		2	980		480
23..	132		19	37		2	770		320
24..	132		19	38		3	605		220
25..	182		30	38		3	692		270
26..	173		30	39		3	2420		2100
27..	164		25	40		3	1700		1200
28..	140		20	40		3	945		440
29..	118		16	40		3	700		280
30..	112		15	--		--	545		180
31..	99		12	--		--	425		120
Total	1994		239	1316		102	48687		40173

T Less than 0.5 ton.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1820. ST. MARYS RIVER NEAR FORT WAYNE, IND.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued  
(Where no concentrations are reported, loads are estimated)

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	350		90	1500		950	82		9
2..	577		200	1160		650	77		8
3..	3050		3000	945		440	77		8
4..	3930		4600	770		330	68		7
5..	3930		4600	605		220	58		5
6..	4050		4800	485		150	54		4
7..	4410		5500	375		100	58		5
8..	4940		6600	300		70	140		20
9..	4800		6300	250		55	105		13
10..	3690		4100	230		45	68		7
11..	2130		1700	191		35	54		4
12..	1300		760	173		30	43		3
13..	945		440	182		30	58		5
14..	700		280	425		120	69		7
15..	515		170	280		65	140		20
16..	375		100	182		30	400		110
17..	290		70	140		20	230		45
18..	250		55	156		25	125		17
19..	260		55	140		20	99		12
20..	1740		1200	118		16	191		35
21..	4660		6000	118		16	527		170
22..	5970		8800	88		10	1120		600
23..	6450		10000	72		7	475		150
24..	6320		9800	66		6	210		40
25..	5870		8700	66		6	118		16
26..	4940		6600	173		30	82		9
27..	3810		4300	1740		1200	77		8
28..	3570		3800	700		280	71		7
29..	3220		3300	270		60	60		5
30..	2320		1900	148		25	49		4
31..	--		--	105		13	--		--
Total	89362		107820	12163		5054	4985		1353
Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	42		3	21		1	14	--	1
2..	39		3	18		1	14	--	1
3..	41		3	18		1	16	--	1
4..	31		2	19		1	14	--	1
5..	26		1	18		1	14	--	1
6..	23		1	18		1	13	14	T
7..	50		4	17		1	12	13	T
8..	112		15	17		1	12	13	T
9..	112		15	16		1	12	13	T
10..	88		10	15		1	12	13	T
11..	72		7	16		1	12	13	T
12..	65		6	18		1	12	13	T
13..	82		9	24		1	12	13	T
14..	88		10	20		1	11	13	T
15..	77		8	17		1	10	9	T
16..	72		7	17		1	11	13	T
17..	61		6	16		1	11	13	T
18..	48		4	15		1	12	13	T
19..	38		3	16		1	15	--	1
20..	34		2	17		1	20	--	1
21..	30		2	18		1	22	--	1
22..	29		2	19		1	20	--	1
23..	26		1	20		1	23	--	1
24..	24		1	18		1	19	--	1
25..	21		1	17		1	17	--	1
26..	19		1	18		1	17	--	1
27..	19		1	16		1	18	--	1
28..	30		2	17		1	16	--	1
29..	43		3	18		1	15	--	1
30..	34		2	19		1	14	--	1
31..	26		1	16		1	--	--	--
Total	1502		136	549		31	440	--	22
Total discharge for year (cfs-days).....									162308.7
Total load for year (tons).....									151999

T Less than 0.5 ton.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERTVILLE, OHIO

LOCATION.--At gaging station at bridge on State Highway 64 at Waterville, Lucas County, 3 miles downstream from Tontogany Creek. Monitor located in water treatment plant about 1,500 feet upstream from bridge.

DRAINAGE AREA (revised).--6,329 square miles.

RECORDS AVAILABLE.--Chemical analyses: March 1950 to February 1952, May 1963 to September 1964.

Water temperatures: March 1950 to September 1964.

Sediment records: April 1950 to September 1964.

EXTREMES, May 1963 to September 1964.--Specific conductance: Maximum daily, 1,050 micromhos Jan. 15, 1964; minimum daily, 320 micromhos Apr. 23-25, 1964.

Water temperatures: Maximum, 93°F July 27, 1964; minimum, freezing point Feb. 8-11, 21.

Sediment concentrations (1963-64): Maximum daily, 708 ppm Mar. 27; minimum daily, 2 ppm Dec. 29, 30.

Sediment loads: Maximum daily, 80,100 tons Apr. 23; minimum daily, 1 ton on several days in October, December, and January.

EXTREMES, 1950-64.--Specific conductance (1950-52, 1963-64): Maximum daily, 1,050 micromhos Jan. 15, 1964; minimum daily, 213 micromhos Jan. 30, 1952.

Water temperatures: Maximum, 94°F July 1, 1963; 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, 1956, and 1963.

Sediment loads: Maximum daily, 208,000 tons Feb. 12, 1959; minimum daily, less than 0.50 ton on several days during October to December 1953, and September 1955.

REMARKS.--Flow affected by ice Dec. 13 to Jan. 29, Feb. 10-12, 24, 25. Low flow slightly regulated by powerplants above station.

Data from continuous recorder, May to September 1963

Day	APRIL								MAY							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..									--	--	--	--	--	--	--	--
2..									590	--	7.2	6.7	--	--	60	54
3..									590	580	7.1	6.7	15.0	10.2	63	57
4..									600	560	6.7	6.6	15.0	11.5	62	51
5..									560	540	6.6	5.8	15.0	10.6	66	60
6..									580	540	6.6	6.2	15.0	10.9	65	60
7..									610	560	6.5	6.2	14.8	8.7	68	60
8..									600	560	9.4	6.2	13.0	6.8	72	62
9..									570	540	9.5	9.0	11.4	6.8	76	68
10..									580	--	9.2	9.0	10.4	5.1	76	68
11..									580	570	9.1	8.2	10.6	5.2	68	63
12..									570	560	9.1	8.6	11.1	6.2	68	62
13..									610	570	8.9	8.5	9.6	6.3	66	60
14..									600	580	9.0	8.6	10.9	5.7	70	62
15..									620	580	9.2	8.4	13.0	6.3	68	60
16..									620	590	9.1	8.7	12.7	6.6	72	63
17..									600	580	9.2	8.8	11.7	6.5	65	63
18..									610	600	9.2	8.8	12.0	6.9	69	62
19..									600	580	9.3	9.0	13.4	7.5	69	62
20..									610	570	9.3	9.0	12.8	6.0	68	62
21..									610	580	9.5	9.2	--	6.8	68	63
22..									580	570	9.5	9.1	12.4	6.2	64	60
23..									600	580	9.4	9.2	15.0	7.0	68	60
24..									610	580	9.5	9.2	15.0	6.8	69	58
25..									620	550	9.5	9.0	15.0	7.6	71	58
26..									570	520	9.5	9.0	15.0	7.5	72	63
27..									560	530	9.4	8.4	15.0	5.7	69	62
28..									620	560	9.4	9.0	12.2	5.4	70	66
29..									620	600	9.4	8.8	12.4	5.4	70	64
30..									610	590	9.4	8.8	13.5	7.2	75	64
31..									640	590	9.1	8.3	12.9	7.6	76	67

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Data from continuous recorder, May to September 1963--Continued

JUNE										JULY									
Day	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)				
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min			
1..	630	600	9.1	8.1	12.8	6.9	79	70	--	--	--	--	--	--	--	--			
2..	640	600	8.8	8.1	12.0	5.6	80	70	--	--	--	--	--	--	--	--			
3..	650	590	8.4	7.7	11.1	6.0	81	74	--	--	--	--	--	--	--	--			
4..	650	600	8.3	7.8	9.4	3.0	86	74	--	--	--	--	--	--	--	--			
5..	640	560	8.8	7.9	7.5	5.2	85	75	--	--	--	--	--	--	--	--			
6..	640	540	8.9	8.3	7.3	5.1	82	75	--	--	--	--	--	--	--	--			
7..	540	510	8.8	8.0	7.5	3.3	82	75	--	--	--	--	--	--	--	--			
8..	580	540	8.5	7.9	6.8	3.8	81	76	410	400	8.1	7.5	11.4	5.2	81	70			
9..	610	600	8.5	8.2	7.6	3.9	82	78	--	--	--	--	--	--	--	--			
10..	--	--	8.5	8.2	7.8	3.9	82	78	--	--	--	--	--	--	--	--			
11..	680	650	8.2	7.9	4.6	2.8	79	77	--	--	--	--	--	--	--	--			
12..	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
13..	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
14..	610	560	8.0	6.3	8.2	6.0	75	70	--	--	--	--	--	--	--	--			
15..	620	610	7.3	7.0	8.4	6.8	75	72	460	430	9.4	7.5	11.4	6.0	84	76			
16..	630	620	7.7	7.3	9.9	6.4	76	71	440	380	9.6	8.6	11.0	3.5	84	70			
17..	--	--	--	--	--	--	--	--	420	400	8.9	7.8	11.2	5.4	85	80			
18..	560	500	8.6	8.5	15.0	10.5	82	74	--	--	--	--	--	--	--	--			
19..	500	440	9.0	8.4	15.0	8.6	80	74	--	--	--	--	--	--	--	--			
20..	490	460	9.1	7.6	14.2	7.4	81	74	--	--	--	--	--	--	--	--			
21..	530	490	8.0	6.7	13.5	8.2	81	68	--	--	--	--	--	--	--	--			
22..	540	530	7.0	6.8	12.8	7.8	81	68	--	--	--	--	--	--	--	--			
23..	540	470	7.4	7.0	12.3	6.6	82	69	--	--	--	--	--	--	--	--			
24..	480	420	9.1	7.2	12.3	5.6	80	72	600	570	7.3	7.0	8.6	7.0	84	82			
25..	420	390	9.4	7.8	11.8	6.0	88	69	570	530	7.4	7.1	9.5	7.0	86	82			
26..	--	--	--	--	--	--	--	--	560	510	7.5	7.0	10.4	6.8	88	82			
27..	--	--	--	--	--	--	--	--	520	510	7.2	7.1	10.4	6.2	87	80			
28..	--	--	--	--	--	--	--	--	520	510	7.0	7.0	10.2	7.0	88	78			
29..	--	--	--	--	--	--	--	--	520	520	7.0	6.8	8.7	4.4	87	79			
30..	--	--	--	--	--	--	--	--	520	510	6.9	6.8	8.2	2.5	88	75			
31..	--	--	--	--	--	--	--	--	520	510	6.9	6.8	11.0	5.1	86	74			
AUGUST										SEPTEMBER									
1..	520	490	7.0	6.5	10.2	5.7	87	77	400	370	7.5	6.9	12.5	6.2	--	--			
2..	490	450	7.0	6.7	11.5	4.7	82	75	400	380	6.7	6.5	13.0	4.6	--	--			
3..	470	460	6.5	6.3	10.3	4.5	82	75	400	390	6.5	6.2	12.8	4.2	--	--			
4..	480	460	6.6	6.5	9.0	5.3	81	75	410	400	6.2	6.1	12.6	5.5	--	--			
5..	480	470	6.6	6.5	7.8	4.6	82	78	420	400	6.9	6.2	14.2	4.8	--	--			
6..	570	470	7.1	6.5	8.2	5.2	79	76	420	410	6.7	6.5	13.5	4.7	--	--			
7..	560	550	7.3	6.7	7.0	5.8	83	78	--	--	6.6	6.4	12.8	5.2	--	--			
8..	--	--	--	--	--	--	--	--	450	440	6.6	6.3	11.7	4.8	--	--			
9..	--	--	--	--	--	--	--	--	460	440	6.3	6.2	11.6	5.7	--	--			
10..	--	--	--	--	--	--	--	--	460	460	6.2	6.0	12.1	5.9	--	--			
11..	--	--	--	--	--	--	--	--	480	460	6.1	6.1	12.3	4.4	--	--			
12..	--	--	--	--	--	--	--	--	480	470	6.1	6.0	10.3	6.2	72	63			
13..	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
14..	460	450	7.7	7.2	11.7	7.5	74	72	440	400	7.1	6.5	13.1	7.2	69	58			
15..	520	430	7.6	6.9	13.1	7.2	81	72	440	380	7.1	6.3	13.4	5.8	73	59			
16..	450	430	7.6	7.1	14.2	8.3	78	68	440	400	7.2	6.3	13.0	5.6	77	67			
17..	500	450	7.0	6.7	13.7	7.6	74	68	430	400	7.2	6.3	12.3	6.1	75	60			
18..	--	--	--	--	14.7	9.5	--	--	440	420	7.0	6.4	12.0	5.3	76	62			
19..	--	--	--	--	--	--	--	--	460	420	7.0	6.2	11.6	5.2	78	65			
20..	--	--	--	--	--	--	--	--	450	420	6.6	6.0	8.4	4.5	68	64			
21..	--	--	--	--	--	--	--	--	470	420	7.1	5.9	9.4	3.9	71	66			
22..	--	--	--	--	--	--	--	--	420	400	7.2	6.2	10.0	6.6	68	60			
23..	--	--	--	--	--	--	--	--	430	410	7.1	6.4	10.2	6.5	68	57			
24..	--	--	--	--	--	--	--	--	430	380	7.0	6.4	8.7	4.5	--	--			
25..	--	--	--	--	--	--	--	--	450	380	6.9	6.5	8.1	3.7	70	64			
26..	410	400	7.5	7.1	10.5	7.6	78	73	460	400	6.8	6.4	8.4	3.0	72	60			
27..	420	410	6.8	6.5	12.2	6.2	80	72	460	430	6.7	6.1	9.2	2.3	72	61			
28..	430	420	6.4	6.4	11.9	6.2	--	--	490	460	6.7	6.1	8.9	5.2	69	62			
29..	440	430	6.4	6.3	11.7	5.5	75	71	--	--	--	--	--	--	--	--			
30..	440	380	7.5	6.3	12.0	6.1	79	71	--	--	--	--	--	--	--	--			
31..	440	390	7.6	6.9	12.5	5.9	--	--	--	--	--	--	--	--	--	--			



## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Data from continuous recorder, water year October 1963 to September 1964

OCTOBER																	NOVEMBER																
Day	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)																		
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min																	
1..	480	440	6.5	6.2	8.1	3.3	69	60	540	500	7.6	7.0	11.7	6.0	54	50																	
2..	500	450	6.3	6.2	10.0	5.8	69	63	520	490	7.6	7.3	12.4	10.0	50	45																	
3..	490	450	6.2	6.1	8.2	6.0	65	62	630	580	7.6	7.3	13.5	8.2	52	41																	
4..	480	450	---	---	---	---	68	54	620	590	7.6	7.3	13.2	9.0	48	44																	
5..	500	450	6.1	5.9	---	---	70	54	680	610	7.5	7.1	11.7	6.0	50	46																	
6..	520	460	---	---	---	---	72	64	700	630	7.4	7.1	11.4	8.2	51	48																	
7..	520	480	---	---	---	---	73	63	680	650	7.3	7.0	12.0	7.2	56	48																	
8..	540	480	7.4	6.9	---	---	70	60	670	630	7.3	7.1	12.4	7.0	56	45																	
9..	550	490	7.3	7.0	---	---	70	62	680	630	7.4	7.2	---	---	55	45																	
10..	540	490	7.5	6.8	---	---	70	57	680	650	7.4	7.1	12.3	6.0	53	48																	
11..	520	480	7.4	6.7	---	---	70	58	690	660	7.4	7.3	12.4	10.0	51	44																	
12..	520	480	7.3	6.6	---	---	68	58	680	660	7.5	7.3	12.9	8.7	46	44																	
13..	520	480	7.3	6.8	---	---	66	53	680	650	7.5	7.3	12.9	9.0	45	42																	
14..	510	480	7.3	6.8	---	---	68	53	690	680	7.4	7.2	13.4	8.3	48	42																	
15..	520	470	7.2	6.7	---	---	65	53	740	670	7.5	7.3	12.8	9.8	50	43																	
16..	520	490	7.2	6.8	---	---	70	60	810	740	7.4	7.3	13.0	8.1	52	44																	
17..	520	500	7.2	6.6	---	---	70	57	750	710	7.5	7.2	12.3	5.4	56	48																	
18..	520	500	7.2	6.7	---	---	68	60	780	740	7.4	7.1	11.3	8.5	55	50																	
19..	540	500	7.2	6.5	---	---	68	60	760	680	7.5	7.3	13.6	7.4	50	45																	
20..	540	500	7.4	6.7	---	---	72	57	760	720	7.5	7.4	13.0	6.7	51	45																	
21..	520	500	7.3	6.6	---	---	65	61	800	760	7.6	7.3	12.0	6.8	56	50																	
22..	540	510	7.3	6.6	---	---	70	60	810	790	7.5	7.3	11.4	5.6	56	51																	
23..	550	530	7.6	6.7	13.4	7.5	70	58	810	740	7.7	7.2	14.5	4.7	60	46																	
24..	560	530	7.6	7.1	12.9	6.4	69	58	760	710	7.7	7.5	15.0	8.4	48	41																	
25..	560	540	7.5	6.9	12.2	6.4	70	61	810	710	7.7	7.5	14.6	10.2	47	39																	
26..	560	540	7.6	7.1	12.0	5.7	72	60	850	760	7.7	7.5	13.5	9.4	50	43																	
27..	550	540	7.5	7.1	12.3	6.0	64	60	780	740	7.6	7.5	14.4	11.3	50	42																	
28..	540	500	7.4	6.9	12.8	7.0	62	53	800	740	7.8	7.5	14.6	8.4	50	40																	
29..	540	500	7.5	7.1	11.7	6.8	56	48	810	760	7.9	7.6	14.6	11.1	44	39																	
30..	550	490	7.4	7.2	13.0	6.0	57	45	820	760	7.9	7.7	14.8	11.4	44	38																	
31..	520	510	7.4	7.2	11.7	7.6	52	50	---	---	---	---	---	---	---	---																	
DECEMBER																	JANUARY																
1..	820	780	8.0	7.8	15.0	11.4	40	35	980	920	7.9	7.6	15.0	12.6	35	33																	
2..	820	730	8.1	7.9	15.0	12.1	38	35	960	890	7.9	7.6	14.9	12.0	34	33																	
3..	780	730	8.0	7.8	15.0	12.7	40	33	990	920	7.9	7.5	15.0	11.1	35	33																	
4..	790	750	8.1	7.8	15.0	12.3	39	34	1000	920	7.9	7.5	15.0	10.6	35	33																	
5..	800	760	8.1	8.0	15.0	12.2	39	34	990	900	8.0	7.7	15.0	11.2	35	33																	
6..	810	760	8.0	7.8	15.0	11.7	40	34	970	890	7.8	7.4	15.0	11.9	35	33																	
7..	840	780	7.8	7.7	15.0	11.7	45	36	970	890	7.7	7.3	15.0	11.7	35	33																	
8..	820	790	7.9	7.7	14.9	11.6	40	38	960	900	7.8	7.5	15.0	11.8	35	33																	
9..	840	760	7.9	7.8	15.0	11.4	39	34	970	850	7.8	7.5	15.0	11.8	35	33																	
10..	860	820	7.8	7.6	14.8	10.9	38	34	960	840	7.9	7.5	15.0	13.5	35	33																	
11..	870	830	7.8	7.6	14.1	10.7	37	33	950	890	8.0	7.6	15.0	12.7	35	33																	
12..	840	800	7.9	7.6	13.4	10.9	36	33	990	910	7.7	7.4	15.0	15.0	35	33																	
13..	930	770	7.9	7.6	13.4	6.8	34	33	1030	980	7.9	7.3	15.0	13.4	34	33																	
14..	940	830	7.9	7.6	15.0	6.4	36	33	1030	980	8.0	7.7	15.0	15.0	34	33																	
15..	930	850	7.8	7.6	15.0	13.9	36	33	1050	990	8.0	7.7	15.0	15.0	34	33																	
16..	890	830	8.1	7.7	15.0	15.0	33	33	---	---	7.9	7.7	15.0	15.0	35	33																	
17..	900	840	7.9	7.7	15.0	15.0	36	33	---	---	8.0	7.7	15.0	15.0	35	33																	
18..	880	830	7.9	7.4	15.0	13.8	34	33	---	---	8.1	7.7	15.0	15.0	35	33																	
19..	940	880	7.8	7.6	15.0	15.0	33	33	---	---	8.1	7.7	15.0	15.0	35	33																	
20..	960	910	8.3	7.7	15.0	15.0	34	33	---	---	7.9	7.7	15.0	15.0	35	33																	
21..	980	910	8.4	8.1	15.0	13.7	34	33	---	---	8.1	7.8	15.0	15.0	35	33																	
22..	980	930	8.4	8.1	15.0	13.5	36	33	---	---	8.0	7.6	15.0	7.3	40	33																	
23..	960	910	8.4	8.1	15.0	13.4	33	33	---	---	7.8	7.6	15.0	15.0	35	33																	
24..	950	910	8.4	8.2	15.0	13.0	33	33	---	---	7.7	7.5	15.0	15.0	35	33																	
25..	980	900	8.2	7.5	15.0	12.0	35	33	---	---	7.6	7.4	15.0	13.2	35	33																	
26..	970	870	7.9	7.5	15.0	12.6	36	33	---	---	7.8	7.4	15.0	12.3	34	33																	
27..	940	870	8.1	7.7	15.0	11.7	35	33	---	---	8.1	7.6	15.0	11.4	34	33																	
28..	950	870	8.0	7.7	15.0	11.4	36	33	---	---	7.8	7.5	14.0	11.6	35	33																	
29..	960	890	8.1	7.7	15.0	12.3	35	33	---	---	7.7	7.4	12.7	11.5	36	33																	
30..	970	890	8.0	7.7	15.0	12.3	35	33	---	---	7.9	7.5	15.0	11.1	36	33																	
31..	980	900	8.0	7.7	15.0	12.6	35	33	---	---	8.2	7.6	15.0	12.5	36	34																	

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERTVILLE, OHIO--Continued

Data from continuous recorder, water year October 1963 to September 1964--Continued

Data from continuous recorder, water year October 1965 to September 1967 - continued																
Day	FEBRUARY								MARCH							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..	--	--	7.6	7.3	15.0	11.7	36	34	910	840	8.0	7.3	--	--	42	35
2..	--	--	7.7	7.2	15.0	12.0	36	34	910	840	7.6	5.4	--	--	51	34
3..	--	--	7.7	6.9	13.5	12.3	38	33	--	--	--	--	--	--	--	--
4..	--	--	7.8	6.8	--	--	39	33	--	--	--	--	--	--	--	--
5..	--	--	7.9	7.4	--	--	40	33	--	--	--	--	--	--	--	--
6..	--	--	7.7	7.4	--	--	37	35	--	--	--	--	--	--	--	--
7..	--	--	7.8	7.3	--	--	37	34	--	--	--	--	--	--	--	--
8..	--	--	8.4	7.6	--	--	36	32	--	--	--	--	--	--	--	--
9..	--	--	8.2	7.7	--	--	35	32	--	--	--	--	--	--	--	--
10..	--	--	8.2	7.7	--	--	37	32	--	--	--	--	--	--	--	--
11..	--	--	8.1	7.5	--	--	39	32	--	--	--	--	--	--	--	--
12..	--	--	8.4	7.6	--	--	38	33	--	--	--	--	--	--	--	--
13..	--	--	8.1	7.4	--	--	38	33	--	--	--	--	--	--	--	--
14..	--	--	8.0	7.5	--	--	43	33	--	--	--	--	--	--	--	--
15..	--	--	8.1	7.6	--	--	39	33	--	--	--	--	--	--	--	--
16..	--	--	--	--	--	--	41	33	--	--	--	--	--	--	--	--
17..	480	420	7.2	6.9	14.1	11.0	44	41	--	--	--	--	--	--	--	--
18..	--	--	--	--	--	--	39	33	420	380	7.3	6.8	12.0	10.2	43	39
19..	--	--	--	--	--	--	38	34	420	380	7.0	6.7	10.9	9.7	43	40
20..	--	--	--	--	--	--	40	33	410	390	7.0	6.6	11.0	9.5	41	40
21..	--	--	--	--	--	--	42	32	430	390	7.0	6.7	10.7	9.4	41	39
22..	950	890	8.0	7.4	--	--	42	33	450	420	7.0	6.7	10.8	9.7	43	40
23..	960	880	8.2	7.6	--	--	41	33	500	450	6.9	6.6	10.6	9.2	44	40
24..	990	860	8.5	6.2	--	--	39	33	490	440	6.8	6.7	10.3	8.8	46	41
25..	1030	940	8.2	5.9	--	--	39	33	550	460	6.8	6.5	10.1	8.6	46	43
26..	950	850	8.1	7.4	--	--	42	33	570	480	6.8	6.7	10.2	8.4	43	42
27..	970	800	8.5	6.2	--	--	39	33	550	450	6.8	6.7	10.6	9.0	42	39
28..	910	800	8.2	7.7	--	--	40	33	460	420	6.8	6.7	9.4	8.6	42	41
29..	880	790	8.2	7.4	--	--	43	33	510	430	7.0	5.4	14.0	9.4	42	41
30..	--	--	--	--	--	--	--	--	470	430	7.2	6.8	12.6	10.1	42	38
31..	--	--	--	--	--	--	--	--	490	450	7.3	6.2	12.4	9.9	41	38
APRIL								MAY								
1..	510	470	7.3	6.9	11.1	10.2	41	37	480	440	--	--	10.8	9.8	59	58
2..	520	490	7.2	6.7	11.5	9.6	41	39	470	430	--	--	10.8	6.4	63	56
3..	560	500	7.1	6.7	11.7	9.6	41	40	500	440	--	--	10.5	6.6	63	57
4..	570	470	7.1	6.8	12.0	7.2	42	39	520	500	--	--	10.2	8.1	64	60
5..	500	400	7.0	6.7	11.1	9.3	42	40	540	500	--	--	13.5	6.0	66	61
6..	420	360	6.9	6.5	12.0	9.0	46	42	560	530	--	--	12.1	8.4	66	62
7..	410	380	6.6	6.4	10.2	6.4	49	45	550	520	--	--	12.0	8.7	72	66
8..	430	410	6.6	5.7	8.0	6.0	48	47	560	530	--	--	10.9	4.6	71	64
9..	430	410	6.6	6.4	11.1	6.0	50	46	590	530	--	--	12.4	4.2	69	64
10..	430	410	6.6	6.4	10.4	8.0	50	47	580	560	--	--	13.9	3.9	70	63
11..	450	420	6.7	5.6	11.1	7.3	51	47	580	530	--	--	13.6	4.9	70	64
12..	430	410	6.7	6.3	10.6	6.7	52	49	550	540	--	--	12.2	4.1	68	63
13..	440	430	6.6	6.4	7.7	6.1	50	50	590	550	--	--	10.6	3.2	66	62
14..	--	--	--	--	--	--	--	--	590	570	--	--	11.0	3.0	66	60
15..	490	460	6.6	6.4	10.9	7.9	56	54	--	--	--	--	--	--	--	--
16..	510	460	6.7	6.2	10.6	5.6	63	52	--	--	--	--	--	--	--	--
17..	530	480	6.5	6.2	11.4	6.4	60	58	--	--	--	--	--	--	--	--
18..	560	510	6.6	6.1	10.3	5.0	61	56	--	--	--	--	--	--	--	--
19..	540	510	6.6	6.1	10.0	4.7	56	52	--	--	--	--	--	--	--	--
20..	550	510	6.6	6.2	10.9	6.3	52	51	--	--	--	--	--	--	--	--
21..	600	550	6.6	6.5	10.5	6.4	54	51	--	--	--	--	--	--	--	--
22..	600	370	--	--	14.2	6.1	52	51	--	--	--	--	--	--	--	--
23..	370	320	--	--	11.4	5.2	55	52	520	460	--	--	12.9	4.5	80	70
24..	330	320	--	--	9.9	5.2	56	52	520	480	--	--	8.1	3.0	76	70
25..	340	320	--	--	9.3	3.9	57	52	550	450	--	--	11.7	7.5	82	69
26..	420	340	--	--	11.0	4.6	57	54	600	510	--	--	8.7	7.2	76	69
27..	440	370	--	--	9.4	3.8	57	54	610	520	--	--	8.6	6.0	76	69
28..	420	390	--	--	7.6	4.2	60	54	620	570	--	--	15.0	7.5	72	68
29..	450	410	--	--	9.7	4.5	60	56	650	580	--	--	7.2	4.8	70	66
30..	--	--	--	--	--	--	--	--	670	620	--	--	15.0	8.2	70	64
31..	--	--	--	--	--	--	--	--	700	570	--	--	14.2	6.6	68	64



## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Suspended sediment, water year October 1963 to September 1964  
(Where no concentrations are reported, loads are estimated)

(where no concentrations are reported, loads are estimated)										
Day	OCTOBER			NOVEMBER			DECEMBER			
	Mean dis-charge (cfs)	Suspended sediment		Mean dis-charge (cfs)	Suspended sediment		Mean dis-charge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day	
1..	129	20	7	208	8	4	165	5	2	
2..	100	20	5	262	8	6	147	5	2	
3..	151	20	8	156	8	3	202	5	3	
4..	64	20	3	135	7	2	188	5	2	
5..	36	20	2	267	7	5	180	5	2	
6..	33	20	2	294	7	6	202	5	3	
7..	96	20	5	285	7	5	258	5	3	
8..	150	18	7	303	7	6	254	5	3	
9..	92	16	4	285	7	5	260	4	3	
10..	36	15	1	285	8	6	290	5	4	
11..	36	14	1	355	7	7	96	5	1	
12..	42	13	1	298	5	4	171	5	2	
13..	45	12	1	240	5	3	220	5	3	
14..	48	12	2	153	5	2	160	5	2	
15..	69	11	2	217	6	4	150	5	2	
16..	82	10	2	210	6	3	150	4	2	
17..	111	12	4	210	7	4	160	5	2	
18..	82	13	3	285	7	5	160	5	2	
19..	87	13	3	186	8	4	150	5	2	
20..	78	13	3	141	10	4	140	5	2	
21..	135	12	4	254	10	7	130	5	2	
22..	147	10	4	201	10	5	130	5	2	
23..	141	10	4	568	--	30	130	4	1	
24..	123	10	3	169	12	5	150	4	2	
25..	117	9	3	180	10	5	160	4	2	
26..	147	8	3	337	10	9	170	4	2	
27..	123	8	3	303	9	7	180	4	2	
28..	87	7	2	232	9	6	190	3	2	
29..	129	7	2	258	8	6	180	2	1	
30..	96	7	2	225	6	4	180	2	1	
31..	147	8	3	--	--	--	180	3	1	
Total	2959	--	99	7502	--	172	5483	--	65	
Day	JANUARY			FEBRUARY			MARCH			
	Mean dis-charge (cfs)	Suspended sediment		Mean dis-charge (cfs)	Suspended sediment		Mean dis-charge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day	
1..	160	4	2	855	10	23	296	4	3	
2..	160	3	1	758	7	14	416	4	4	
3..	160	3	1	696	7	13	623	4	7	
4..	160	3	1	658	7	12	1160	5	16	
5..	170	3	1	593	9	14	3490	--	100	
6..	200	3	2	551	10	15	5880	20	318	
7..	240	4	2	556	10	15	7600	26	534	
8..	260	4	3	511	10	14	6020	74	1200	
9..	360	5	5	434	10	12	5150	104	1450	
10..	400	5	5	410	9	10	7310	107	2110	
11..	550	5	7	380	9	9	11100	203	6080	
12..	750	6	12	360	9	9	13200	328	11700	
13..	550	7	10	357	9	9	12600	344	11700	
14..	400	9	10	371	8	8	13500	291	10600	
15..	300	10	8	343	7	6	20600	328	18200	
16..	320	10	9	362	6	6	20800	388	21800	
17..	350	10	9	346	5	5	17000	326	15000	
18..	320	10	9	323	5	4	13400	217	7850	
19..	290	10	8	365	5	5	9620	164	4260	
20..	370	10	10	364	5	5	6290	118	2000	
21..	450	10	12	329	5	4	5190	100	1400	
22..	600	10	16	298	5	4	7050	93	1770	
23..	850	10	23	309	5	4	7180	96	1860	
24..	1000	11	30	300	5	4	6720	161	2920	
25..	1200	12	39	270	5	4	5680	143	2190	
26..	1500	13	53	295	5	4	14800	239	5	10600
27..	1500	13	53	304	5	4	19700	708	37600	
28..	1400	12	45	294	5	4	16000	540	23300	
29..	1200	12	39	303	5	4	11200	369	11200	
30..	1050	11	31	--	--	--	8530	246	5660	
31..	860	11	26	--	--	--	6620	174	3110	
Total	18080	--	482	12295	--	244	284725	--	216542	

8 Computed by subdividing day.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Suspended sediment, water year October 1963 to September 1964--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..	5250	138	1960	12800	158	5460	1970	41	218
2..	4670	--	1900	9300	133	3340	1170	40	126
3..	11200	--	9400	6850	86	1590	864	40	93
4..	20900	392	22100	5240	87	1230	564	40	61
5..	24500	518	34300	3930	--	900	679	39	71
6..	25300	533	36400	3050	--	700	631	35	60
7..	24600	448	29800	2400	--	500	609	26	43
8..	23800	368	23600	1970	--	390	621	13	22
9..	20900	372	21000	1900	--	320	1130	24	73
10..	16300	353	15500	1260	--	170	1750	32	151
11..	11900	360	15600	1060	31	76	1210	30	98
12..	9200	280	6960	1080	26	76	1060	27	77
13..	6670	212	3820	1120	25	89	860	25	58
14..	5130	178	2460	1320	25	89	569	25	38
15..	3890	168	1760	2580	25	174	694	32	60
16..	3220	160	1390	2460	23	153	958	--	110
17..	2870	150	1160	1780	22	106	6030	--	1500
18..	2040	140	771	1340	21	76	6320	--	1400
19..	2090	130	734	1320	20	71	4470	--	700
20..	3340	118	1060	742	20	40	2660	--	360
21..	16300	177	9420	878	18	43	2230	--	350
22..	41300	626	73000	892	17	41	5850	119	1880
23..	46800	634	80100	864	17	40	7870	153	3250
24..	42200	440	50100	836	17	38	6870	134	2480
25..	31700	285	24400	531	17	24	6150	148	2460
26..	20900	220	12400	794	17	36	1870	--	600
27..	14800	194	7750	1120	19	57	945	--	200
28..	14800	173	6910	3460	--	430	958	--	140
29..	18000	214	10400	7020	--	2300	734	39	77
30..	15900	186	7980	4430	--	800	591	33	53
31..	--	--	--	2980	48	386	--	--	--
Total	490470	--	514135	87307	--	19745	68887	--	16809
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..	506	31	42	177	10	5	166	32	14
2..	437	30	35	245	10	7	166	30	13
3..	400	28	30	237	8	5	213	31	18
4..	360	26	25	166	7	3	244	34	22
5..	313	26	22	167	7	3	169	31	14
6..	270	30	22	227	15	9	100	26	7
7..	270	31	22	293	20	16	67	27	5
8..	330	30	27	215	19	11	139	29	11
9..	294	30	24	139	19	7	163	30	13
10..	777	42	88	98	20	5	120	31	10
11..	752	40	81	139	22	8	133	33	12
12..	621	40	67	233	25	16	86	30	7
13..	683	43	79	183	25	12	81	28	6
14..	518	32	45	145	27	10	100	26	7
15..	440	24	28	151	27	13	117	30	9
16..	480	16	21	189	35	18	61	27	4
17..	481	12	16	212	38	22	96	27	7
18..	472	12	15	187	39	20	119	29	9
19..	405	11	12	145	35	14	168	31	14
20..	371	11	11	163	35	15	222	39	23
21..	319	10	9	185	36	18	196	39	21
22..	292	10	8	258	46	32	289	42	33
23..	246	10	7	280	46	35	427	42	48
24..	237	10	6	202	49	27	252	36	24
25..	230	10	6	227	45	28	151	33	13
26..	226	10	6	208	43	24	110	29	9
27..	222	10	6	159	38	16	208	27	15
28..	221	10	6	219	36	21	139	17	6
29..	234	10	6	245	41	27	96	15	4
30..	188	10	5	206	35	19	134	15	5
31..	154	10	4	219	33	20	--	--	--
Total	11749	--	781	6119	--	486	4732	--	403
Total discharge for year (cfs-days).....									1000308
Total load for year (tons).....									769963

S Computed by subdividing day.

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964  
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N<sub>i</sub> in native water;  
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (° F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (ppm)	Sediment discharge (tons per day)	Suspended sediment										Method of analysis	
							Percent finer than size indicated, in millimeters											
							0.0025	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000		2.000
Mar. 27, 1964.....	1110			20800	728		81	87	92	97	99	99	100	--				SDWC
Mar. 27.....	1110			20800	728		26	55	86	97	99	99	100	--				SEN
Apr. 22.....	1330			44100	712		57	66	73	82	90	93	98	100				SDWC
Apr. 22.....	1330			44100	712		19	34	62	82	90	91	98	100				SEN

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1940.1. MAUMEE RIVER AT CRAIG BRIDGE, AT TOLEDO, OHIO

LOCATION --At Craig Bridge in Toledo, Lucas County 1.5 miles downstream from Swan Creek, and about 3.5 miles upstream from mouth.

RECORDS AVAILABLE--Chemical analyses: June 1962 to September 1964.

REMARKS --Determinations of suspended solids, biochemical oxygen demand (BOD), and dissolved oxygen furnished by the city of Toledo, Division of Sewage Disposal. No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Silica (SiO <sub>2</sub> ) num (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) (K)	Potassium (Li)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Suspended solids at 110°C	Hardness as CaCO <sub>3</sub>		Total acidity (micro-mhos at H <sup>+</sup> 25°C)	pH	Coliform or	Biochemical oxygen demand (BOD)
Oct. 2, 1963.						38			156	16	116	42	0.2	0.64	426	66	231	76	597	9.7	10	4.7
Oct. 9.....						---			138	0	97	41	---	---	---	32	205	92	552	7.3	10	3.7
Oct. 16.....						---			130	4	98	43	---	---	---	20	206	93	557	8.3	10	1.0
Oct. 23.....						---			143	0	98	42	---	---	---	24	207	90	562	7.1	10	1.0
Oct. 30.....						---			140	0	103	42	---	---	---	17	210	96	567	7.2	10	5.7
Nov. 6.....						---			153	0	110	40	---	---	---	234	215	90	591	7.2	17	3.1
Nov. 13.....						---			154	0	120	42	---	---	---	58	232	106	628	7.2	15	3.6
Nov. 20.....						---			142	0	102	44	---	---	---	52	214	98	585	7.1	12	2.8
Nov. 27.....						41			180	0	128	46	4.8	.59	388	54	247	100	659	7.2	10	3.9
May 20, 1964.						14			188	0	116	29	16	.44	399	68	298	144	623	7.9	10	2.2
June 10.....						26			184	0	128	34	6.4	.56	436	68	284	133	655	7.5	10	4.0
June 24.....						---			141	0	70	22	---	---	---	72	230	115	518	8.0	17	2.6
July 15.....						17			154	0	82	24	28	.42	350	70	236	110	534	8.0	15	1.8
July 22.....						---			138	0	76	25	---	---	---	68	208	95	493	7.4	20	5.4
July 29.....						---			126	0	76	29	---	---	---	116	202	99	493	7.8	20	7.7
Aug. 5.....						---			127	0	77	30	---	---	---	104	204	90	478	7.2	10	3.8
Aug. 26.....						23			116	0	77	36	14	.66	296	26	184	89	480	7.9	15	8.0
Sept. 2.....						---			117	0	85	34	---	---	---	112	192	96	499	7.9	10	5.8
Sept. 9.....						---			120	0	84	34	---	---	---	70	194	96	503	7.2	10	5.4
Sept. 22.....						29			121	0	95	37	0.6	.70	327	68	190	91	543	7.9	7	8.8
Sept. 30.....						---			132	0	88	39	---	---	---	118	201	93	538	7.3	10	5.0

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
 4-1940.1. MAUMEE RIVER AT CRAIG BRIDGE, AT TOLEDO, OHIO--Continued  
 Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics		Ammonia nitrogen as NH <sub>4</sub>	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as C <sub>6</sub> H <sub>5</sub> OH	Alkyl benzene sulfonate (ABS)					
Oct. 2, 1963.....	3.0	31		0.4				70	
Oct. 9.....	2.0	21		--				15	
Oct. 16.....	2.2	18		--				25	
Oct. 23.....	1.7	19		--				7	
Oct. 30.....	1.8	30		--				20	
Nov. 6.....	2.9	41		--				40	
Nov. 13.....	4.3	71		--				70	
Nov. 20.....	7.7			--					
Nov. 27.....	5.6	51		--				50	
Nov. 27.....	8.2	69		.1				35	
May 20, 1964.....	7.1	71		.1				35	
June 1.....	6.6	73		.1				10	
June 2.....	8.0	72		--				55	
June 24.....	6.2	73		.1				75	
July 15.....	3.3	38		--				20	
July 22.....	3.7	47		--				120	
July 29.....	1.6	20		--				55	
Aug. 5.....	1.3	16		.2				70	
Aug. 26.....	2.5	28		--				35	
Sept. 2.....	1.8	20		--				35	
Sept. 2.....	1.8	20		--				35	
Sept. 22.....	4.4	49		.2				35	
Sept. 30.....	2.2	23		--				130	





	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Aug. 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	Sept. 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	Oct. 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	Nov. 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	Dec. 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	Jan. 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	Feb. 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	Mar. 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	Apr. 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	May 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	June 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 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	Aug. 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	Sept. 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	Oct. 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	Nov. 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	Dec. 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	Jan. 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	Feb. 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	Mar. 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	Apr. 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	May 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	June 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 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	Aug. 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	Sept. 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	Oct. 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	Nov. 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	Dec. 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	Jan. 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	Feb. 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	Mar. 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	Apr. 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	May 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	June 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 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	Aug. 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	Sept. 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	Oct. 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	Nov. 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	Dec. 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	Jan. 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	Feb. 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	Mar. 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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	Mar. 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	Apr. 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	May 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	June 1	2	3	4	5	6
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## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-1940.22. MAUMEE RIVER AT TOLEDO OVERSEAS TERMINAL DOCK, AT TOLEDO, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics			Ammonia nitrogen as $\text{NH}_4$	Nitrite ( $\text{NO}_2$ )	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as $\text{C}_6\text{H}_5\text{OH}$	Alkyl benzene sulfonate (ABS)						
Oct. 2, 1963.....	2.9	30		--					90	
Oct. 9.....	2.2	23		--					15	
Oct. 16.....	1.5	16		0.4					110	
Oct. 23.....	1.0	10		--					45	
Oct. 30.....	1.9	19		--					70	
Nov. 6.....	6.5	60		--					20	
Nov. 13.....	3.9	33		--					10	
Nov. 20.....	6.6	60		--					25	
Nov. 27.....	7.0	62		.2					15	
Dec. 4.....	4.3	36		--					20	
Dec. 11.....	9.4	72		--					15	
Dec. 18.....	9.0	65		.6					15	
Jan. 8, 1964.....	7.7	59		--					4	
Jan. 22.....	7.4	56		--					15	
Jan. 29.....	11.5	81		.3					25	
Feb. 5.....	12.8	95		.4					45	
Feb. 19.....	11.0	82		--					--	
Feb. 26.....	10.8	78		--					10	
Mar. 4.....	9.7	78		--					8	
Mar. 11.....	11.8	86		.3					110	
Mar. 18.....	10.8	83		--					120	
Mar. 25.....	9.2	75		--					85	
Apr. 8.....	8.7	64		--					360	
Apr. 15.....	9.0	87		--					360	
Apr. 22.....	9.5	87		--					330	
Apr. 29.....	9.1	83		.1					150	
May 6.....	7.9	79		--					150	
May 13.....	2.9	30		--					35	



## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1940.3. MAUMEE RIVER AT CENTER C. &amp; O. RAILROAD DOCK, AT TOLEDO, OHIO

LOCATION --At mouth at end of center dock of Chesapeake and Ohio Railroad coal-loading docks, at Toledo, Lucas County.

RECORDS AVAILABLE --Chemical analyses: June 1962 to September 1964.

REMARKS --Determinations of suspended solids, biochemical oxygen demand (BOD), and dissolved oxygen furnished by the city of Toledo, Division of Sewage Disposal.

No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Suspended solids at 110°C	Hardness as CaCO <sub>3</sub>		Total acidity as mhos at 25°C	pH	Coliforms or (BOD)	Biochemical oxygen demand (BOD)
																		Calcium, non-estum	Non-estum				
Oct. 2, 1963.									134	0	62	38					74	168	58	455	7.3	5	4.2
Oct. 9.....									122	0	57	38					60	161	61	443	7.2	5	2.8
Oct. 16.....						31			132	0	74	44		8.8	0.74	270	85	171	53	490	6.8	7	2.5
Oct. 23.....									132	0	59	42					32	174	51	454	7.0	7	2.0
Oct. 30.....									132	0	59	42					32	169	52	454	7.0	7	1.8
Nov. 6.....									134	0	47	38					66	162	52	432	7.2	7	2.9
Nov. 13.....									122	0	50	42					56	160	60	444	7.2	7	4.0
Nov. 20.....									120	0	44	37						152	54	410	7.1	5	4.1
Nov. 27.....						33			130	0	92	42		14	1.0	303	96	188	82	534	7.5	10	4.0
Dec. 4.....									122	0	57	37					214	160	60	449	7.1	8	4.9
Dec. 11.....									146	0	50	34					172	166	46	434	7.3	7	7.6
Dec. 18.....						30			136	0	68	40		6.6	1.2	260	36	170	58	482	7.0	5	3.2
Jan. 8, 1964.									188	0	82	58					86	170	58	482	7.1	10	7.8
Jan. 22.....						60			192	0	116	72		4.4	2.0	420	80	232	74	739	7.1	10	7.8
Jan. 29.....									180	0	90	56					256	222	74	647	7.4	7	9.1
Feb. 5.....						73			252	0	176	78		16	2.1	566	84	328	121	938	7.4	20	10.0
Feb. 19.....																	40	--	--	--	--	--	8.1
Feb. 26.....									140	0	67	52					16	183	68	545	7.1	10	10.4
Mar. 4.....									148	0	88	61					12	206	85	653	6.9	10	7.6
Mar. 11.....						53			209	0	145	70		10	3.3	435	134	251	80	792	7.3	30	8.9
Mar. 18.....									108	0	67	24					144	192	104	449	7.1	33	3.8
Mar. 25.....									116	0	80	26						213	118	489	7.6	30	2.7
Apr. 1.....									114	0	79	23					186	214	121	486	7.4	10	3.8
Apr. 8.....									106	0	60	14					204	182	95	452	8.1	20	3.2
Apr. 15.....									118	0	70	18					160	200	104	437	7.3	25	3.1
Apr. 22.....						13			158	0	101	23		29	.65	330	148	266	136	567	7.4	22	4.1
Apr. 29.....									123	0	62	14		22			136	188	87	412	7.4	30	3.1
May 13.....						14			154	0	100	27					322	254	128	553	7.7	22	2.0

[illegible]

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
4-1940.3. MAUMEE RIVER AT CENTER C. & O. RAILROAD DOCK, AT TOLEDO, OHIO--Continued

Date of collection	Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued					
	Dissolved oxygen		Organics		Ammonia nitrogen as $\text{NH}_4$	Nitrite ( $\text{NO}_2$ )
	Parts per million	Percent saturation	Phenols as $\text{C}_6\text{H}_5\text{OH}$	Alkyl benzene sulfonate (ABS)		
Oct. 2, 1963.....	4.2	43		--		
Oct. 9.....	3.7	37		--		60
Oct. 16.....	1.6	16				50
Oct. 23.....	2.0	21		0.3		90
Oct. 30.....	1.9	19		--		55
Nov. 6.....	7.9	70		--		20
Nov. 13.....	8.5	75		--		60
Nov. 20.....	8.9	79		--		20
Nov. 27.....	6.5	58		.2		95
Dec. 4.....	8.4	69		--		25
Dec. 11.....	10.8	78		--		110
Dec. 18.....	10.2	70		.2		10
Jan. 8, 1964.....	9.7	70		--		55
Jan. 22.....	7.9	57		.4		65
Jan. 28.....	12.4	86		--		90
Feb. 5.....	10.7	79		.5		15
Feb. 19.....	11.5	85		--		--
Feb. 26.....	12.9	91		--		10
Mar. 4.....	9.2	73		--		4
Mar. 11.....	11.2	80		.3		55
Mar. 18.....	10.7	82		--		100
Mar. 25.....	9.0	72		--		70
Apr. 1.....	9.9	76		--		400
Apr. 8.....	8.1	71		--		400
Apr. 15.....	9.5	86		--		450
Apr. 22.....	9.2	84		.2		90
Apr. 29.....	8.9	88		--		140
May 13.....	4.5	47		.2		15

May 20, 1964.....	5.8	62	--				40
June 3.....	6.6	69	--				8
June 10.....	4.3	48	.2				30
June 24.....	5.4	64	--				85
July 13.....	3.2	40	--				13
July 22.....	3.2	40	--				2
July 29.....	1.7	21	.3				8
Aug. 5.....	2.2	27	.0				50
Aug. 26.....	4.7	51	--				100
Sept. 2.....	2.0	23	--				40
Sept. 9.....	3.2	37	--				35
Sept. 22.....	1.6	18	.3				70
Sept. 30.....	5.0	50	--				45



## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-1940-7. MAUMEE RIVER AT BUOY 31, AT TOLEDO, OHIO

LOCATION.---At Buoy 31 in Maumee Bay at Toledo, Lucas County, 4.7 miles out from Center Chesapeake and Ohio Railroad dock at mouth of Maumee River.

REMARKS. A Labri. Samples collected in 1963 and 1964. No discharge records. The data at these two sites are considered comparable. No discharge records. Due to high winds, samples for Sept. 23 and Sept. 30, were taken at Buoy 41. The data at these two sites are considered comparable. No discharge records available.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Silica (SiO <sub>2</sub> ) (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Suspended solids at 110°C	Hardness as CaCO <sub>3</sub>		To-Specific acid conduct- micro- mhos at H <sup>+</sup> 25°C	pH or Col- or	Bio-chemical oxygen demand (BOD)		
																	Cal- cium, mag- nesium	Non- car- bon- ate					
Oct. 2, 1963.						16			116	0	33	32		3.5	0.43	185	38	136	41	346	8.0	5	3.2
Oct. 9.....						--			116	0	23	31		--	--	--	28	131	36	336	7.6	3	3.1
Oct. 16.....						--			114	0	22	26		--	--	--	15	125	32	316	7.5	3	2.5
Oct. 23.....						--			124	0	26	30		--	--	--	54	136	34	342	7.5	3	1.5
May 20, 1964.						13			138	0	66	28		13	.48	284	--	202	89	464	7.5	10	--
June 10.....						--			134	0	41	28		--	--	--	--	164	54	388	7.7	6	--
June 24.....						23			162	0	97	31		31	1.0	388	--	254	121	592	8.2	15	--
July 15.....						14			108	0	44	28		5.4	.42	224	62	145	56	367	7.3	5	4.4
July 22.....						--			79	0	38	27		--	--	--	36	116	52	308	7.8	5	9.4
July 29.....						--			109	0	52	34		--	--	--	--	146	56	380	7.2	6	--
Aug. 5.....						15			104	0	41	32		.2	.39	231	68	136	51	350	7.4	7	4.6
Aug. 26.....						--			97	0	29	28		--	--	--	50	122	42	311	7.4	5	4.2
Sept. 2.....						--			96	0	31	31		--	--	--	64	126	48	325	7.5	5	5.6
Sept. 9.....						--			92	0	30	31		--	--	--	56	120	44	308	7.9	5	3.4
Sept. 22.....						25			116	0	62	39		12	.70	297	104	168	73	456	7.4	7	5.2
Sept. 30.....						--			110	0	50	36		--	--	--	58	148	58	402	7.2	7	3.6

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
 4-1940.7. MAUMEE RIVER AT BUOY 31, AT TOLEDO, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued										
Date of collection	Dissolved oxygen		Organics			Ammonia nitrogen as NH <sub>4</sub>	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as C <sub>6</sub> H <sub>5</sub> OH	Alkyl benzene sulfonate (ABS)						
Oct. 2, 1963.....	9.5	95		0.1					25	
Oct. 9.....	10.4	104		--					4	
Oct. 16.....	10.0	100		--					7	
Oct. 23.....	8.8	88		--					20	
May 20, 1964.....	--	--		.1					80	
June 10.....	--	--		--					65	
June 24.....	--	--		--					30	
July 15.....	8.4	93		.1					5	
July 22.....	10.2	124		--					10	
July 29.....	--	--		--					7	
Aug. 5.....	7.3	88		.1					35	
Aug. 26.....	8.8	94		--					15	
Sept. 2.....	7.8	87		--					15	
Sept. 9.....	8.7	98		--					10	
Sept. 22.....	3.5	39		.2					70	
Sept. 30.....	6.4	63		--					65	

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
4--1980. SANDUSKY RIVER NEAR FREMONT, OHIO

LOCATION (revised).--At gaging station on left bank at highway bridge, 2.3 miles upstream from Ballville power dam, 2.3 miles downstream from Wolf Creek, and 3.5 miles southwest of Fremont.

DRAINAGE AREA.--1,248 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1952, October 1962 to September 1964.

Water temperatures: October 1950 to September 1956.

Sediment records: October 1950 to September 1956.

EXTREMES: 1963-64.--Specific conductance: Maximum daily, 1,250 micromhos Dec. 14; minimum daily, 252 micromhos Apr. 23.

Water temperatures: Maximum, 84.4, on July 20, 21, (1952-53); minimum, 33.4, on many days during January and February, 1953.

Water temperatures: Maximum, 84.4, on July 20, 21, (1952-53); minimum, 33.4, on many days during January and February, 1953.

Water temperatures: Maximum, 84.4, on July 20, 21, (1952-53); minimum, 33.4, on many days during January and February, 1953.

REMARKS.--Samples for iron and manganese filtered clear when collected. Records of specific conductance of daily samples available in district office in Columbus, Ohio. Samples were selected for analysis on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, (3) special sample to further define quality of water, and (4) a composite analysis of all daily samples for each month. Only one special sample was collected during the month of September.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		To-Specific conductance (micro-mhos at 25°C)	pH or Col.	Oxygen consumed			
																			Calcium, magnesium	Non-carbonate			Filtered			
Oct. 7, 1963.	7.1										272	0	212	54	0.7	1.2		629	410	187		946	7.6			
Oct. 29, .....	15										292	0	226	52	.9	1.2		687	454	215		1050	7.4			
Oct. 1-31, .....	9.9										278	0	214	62	.8	1.4		640	424	196		981	7.2			
Nov. 4, .....	26			0.08	0.04						284	0	239	42	.9	3.4			660	458	225		965	7.1		5
Nov. 14, .....	26										312	0	309	40	.8	3.4		740	536	280		1080	7.6			
Nov. 29, .....	19										280	0	282	52	1.0	2.9		712	478	248		1030	7.2			
Nov. 1-30, .....	26.7										284	0	309	40	.9	6.3		766	543	302		1080	7.5			
Dec. 1, .....	21										294	0	309	40	.9	6.3									3	
Dec. 5, .....	24			.15	.19						330	0	353	54	1.2	10	2.0		906	614	343		1250	7.4		
Dec. 14, .....	36										304	0	320	47	1.2	7.1		826	562	313		1140	7.3			
Dec. 1-14, .....	27																									
Jan. 8, 1964.	42			.65	.23						260	0	310	62	.7	10	1.9		747	506	293		1100	6.7		3
Jan. 25, .....	270										180	0	228	42	.7	14		527	370	222		828	6.6			
Jan. 31, .....	150										215	0	263	50	.7	12		625	435	259		951	6.7			
Jan. 25-31, .....	283																									
Feb. 5, .....	70										164	0	168	43	.5	8.4		469	314	179		735	7.1			
Feb. 7, .....	65			.20	.03																				3	
Feb. 26, .....	37										226	0	224	42	.9	6.9						917	7.2			
Feb. 1-29, .....	60.3										193	0	192	37	.7	8.2		535	367	209		818	7.1			

Mar. 3, 1964.	167	--	--	209	0	213	86	.7	7.1	--	610	396	225	955	7.2	--
Mar. 10.....	784	1.0	.03	--	--	46	14	--	--	.42	211	140	74	318	6.7	5
Mar. 12.....	8850	--	--	81	0	116	28	.3	.23	--	357	246	144	548	6.6	10
Mar. 1-31.....	3122	--	--	125	0	--	--	--	--	--	--	--	--	--	--	--
Apr. 8.....	3730	.92	.01	--	--	--	--	--	--	.29	467	351	190	694	6.9	8
Apr. 18.....	324	--	--	196	0	165	24	.4	13	--	180	116	50	252	7.1	--
Apr. 23.....	16700	--	--	80	0	38	6.0	2	2.4	--	311	236	125	486	6.9	--
Apr. 1-30.....	4579	--	--	136	0	98	15	.2	17	--	--	--	--	--	--	--
May 7.....	495	.28	.14	--	--	--	--	--	--	.04	432	340	176	684	7.9	4
May 14.....	304	--	--	200	0	158	24	.4	8.0	--	376	275	140	570	7.7	--
May 17.....	1870	--	--	122	0	123	12	.5	13	--	376	275	140	570	7.7	--
May 1-31.....	627	--	--	184	0	120	18	--	--	--	--	--	--	--	--	--
June 2.....	207	.31	.06	--	--	--	--	--	--	.14	433	312	163	629	8.1	4
June 27.....	145	--	--	182	0	126	22	.6	17	--	334	228	123	503	7.9	7
June 30.....	96	.11	.00	129	0	118	22	.6	5.8	.37	396	282	146	584	8.1	--
June 1-4, 23-30.....	195	--	--	166	0	121	21	.4	12	--	351	223	122	494	7.4	--
July 1.....	82	--	--	124	0	107	20	.5	5.2	--	596	420	248	871	8.2	--
July 30.....	48	--	--	234	0	234	40	.9	1.3	--	592	310	170	659	7.9	--
July 1-31.....	66.9	--	--	156	0	156	26	.6	2.3	--	492	422	240	894	7.4	--
Aug. 9.....	33	--	--	221	0	223	42	.6	.5	--	512	364	188	739	7.9	5
Aug. 13.....	49	.05	.00	--	--	--	--	--	--	1.0	512	364	188	739	7.9	--
Aug. 28.....	50	--	--	214	0	170	30	.6	.2	--	539	398	218	849	7.1	--
Aug. 1-30.....	45.1	--	--	208	0	208	40	.9	1.1	--	637	430	251	917	8.3	--
Sept. 1-30.....	48	.10	.19	210	4	254	35	1.2	1.5	.84	--	--	--	--	--	5

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1980, SANDUSKY RIVER NEAR FREMONT, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued									
Date of collection	Dissolved oxygen		Organics		Ammonia nitrogen as $\text{NH}_4$	Nitrite ( $\text{NO}_2$ )	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as $\text{C}_6\text{H}_5\text{OH}$	Alkyl benzene sulfonate (ABS)					
Nov. 4, 1963.....	8.4	69		0.6				3	0
Dec. 5.....	8.3	61		.5				2	0
Jan. 8, 1964.....	10.7	74		.7				6	M-1
Feb. 7.....	--	--		.2				--	--
Mar. 11.....	7.8	58		.1				500	M-2
Apr. 8.....	8.0	70		.1				120	0
May 7.....	--	--		.0				15	0
June 2.....	8.4	86		.0				100	M-1
June 30.....	11.4	148		.1				50	M-2
Aug. 13.....	10.8	115		.1				10	0
Aug. 28.....	--	--		.5				--	--
Aug. 1-30.....	--	--		.2				--	--
Sept. 23.....	7.4	86		.2				15	0

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1980. SANDUSKY RIVER NEAR FREMONT, OHIO--Continued

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement usually between 0700 and 1800)

[illegible]

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1990. HURON RIVER AT MILAN, OHIO

LOCATION.--Temperature recorder at gaging station on right bank 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 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 92°F July 19, 26; minimum, freezing point on many days during December and January.

EXTREMES, 1953-64.--Water temperatures: Maximum, 92°F July 19, 26, 1964; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964  
(Continuous ethyl alcohol-actuated thermometer)

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

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-2005. BLACK RIVER AT ELYRIA, OHIO

LOCATION--At gaging station on left bank in Cascade Park at Elyria, Lorain County, 0.8 mile downstream from confluence of East and West Branches.  
DRAINAGE AREA--392 square miles.

RECORDS AVAILABLE--Chemical analyses: October 1962 to September 1964.

Water temperatures: October 1962 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 1,910 micromhos Sept. 18; minimum daily, 262 micromhos Apr. 22.

Water temperatures: Maximum, 33°F on many days during December to March.

EXTREMES, 1962-64.--Specific conductance: Maximum daily, 1,910 micromhos Sept. 18, 1964; minimum daily, 215 micromhos Mar. 13, 1963.

Water temperatures: Maximum, 74°F Aug. 5-15; minimum, 33°F on many days during winter months in 1963.

REMARKS--Samples collected for iron and manganese were filtered clear when collected. Values reported for acidity are potential free and determined to pH 7.0.

Records of specific conductance of daily samples available in district office at Columbus, Ohio. Samples were selected for analysis on the following basis:

(1) maximum and minimum specific conductance for each month, (2) daily specific conductance for each month, (3) special sample each month to further define quality of water, and (4) a composite analysis of all daily samples for each month.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Chemical analyses, in parts per million, water year October 1963 to September 1964																							
Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Alu- min- ium (Al)	Iron (Fe)	Mang- anese (Mn)	Cal- cium (Ca)	Mag- nesium (Mg)	Sodium (Na)	Po- tas- sium (K)	Lith- ium (Li)	Bi-car- bon- ate (HCO <sub>3</sub> )	Car- bon- ate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluo- ride (F)	Ni- trate (NO <sub>3</sub> )	Phos- phor- us as PO <sub>4</sub>	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>	Acid- ity as mag- ne- sium	Specific conductance (micro-mhos at 25°C)	Col- or or pH	Oxygen consumed
Oct. 3, 1963.	7.6	--	--	--	--	--	--	--	--	--	76	0	286	138	0.9	13	--	780	210	148	1220	6.5	--
Oct. 9, 1963.	9.1	--	--	--	--	--	--	--	--	--	134	0	330	195	1.0	28	--	980	257	147	1570	6.8	--
Oct. 1-31.....	12.7	--	--	--	--	--	--	--	--	--	122	0	288	175	1.0	12	--	848	216	116	1400	6.6	--
Nov. 4, 1963.	16	--	--	0.50	0.02	--	--	--	--	--	--	--	--	--	--	34	0.0	662	265	250	1040	5.4	18
Nov. 10, 1963.	10	--	--	--	--	--	--	--	--	--	18	0	285	115	.9	3.6	--	662	265	250	1040	5.4	--
Nov. 29, 1963.	19	--	--	--	--	--	--	--	--	--	102	0	230	230	1.6	1.2	--	950	200	28	1600	7.1	17
Nov. 1-30.....	12.3	--	--	--	--	--	--	--	--	--	102	0	248	160	1.2	1.8	--	798	203	120	1340	6.3	--
Dec. 1, 1963.	11	--	--	--	--	--	--	--	--	--	94	0	222	210	1.2	6.2	--	820	190	113	1540	6.4	--
Dec. 5, 1963.	24	--	--	1.2	.12	--	--	--	--	--	81	0	172	135	1.0	78	1.1	702	196	130	1080	6.9	9
Dec. 16, 1963.	14	--	--	--	--	--	--	--	--	--	97	0	220	180	1.0	23	--	766	192	113	1390	6.3	25
Dec. 1-31.....	16.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 8, 1964.	22	--	--	.56	.14	--	--	--	--	--	110	0	190	166	.9	40	1.8	728	218	128	1200	6.5	7
Jan. 9, 1964.	26	--	--	--	--	--	--	--	--	--	178	0	226	264	.4	28	--	946	387	241	1590	6.9	--
Jan. 23, 1964.	55	--	--	--	--	--	--	--	--	--	144	0	216	210	.8	29	--	852	272	154	1400	6.9	--
Jan. 1-31.....	30.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 7, 1964.	31	--	--	1.1	.13	--	--	--	--	--	112	0	205	180	.4	.32	.30	742	315	221	1220	5.9	4
Feb. 10, 1964.	19	--	--	--	--	--	--	--	--	--	114	0	251	230	.8	42	--	902	287	203	1540	6.6	6
Feb. 26, 1964.	18	--	--	--	--	--	--	--	--	--	103	0	242	200	.8	39	--	838	308	223	1380	6.7	--
Feb. 1-29.....	16.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 1, 1964.	15	--	--	--	--	--	--	--	--	--	72	0	265	236	.5	42	--	898	313	254	1450	6.7	--
Mar. 11, 1964.	5170	--	--	1.2	.18	--	--	--	--	--	50	0	63	25	.1	16	.26	205	118	77	317	6.3	8
Mar. 1-31.....	1255	--	--	--	--	--	--	--	--	--	78	0	127	58	.2	18	--	384	205	141	595	6.4	--



STREAMS TRIBUTARY TO LAKE ERIE--Continued  
4-2005. BLACK RIVER AT ELYRIA, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued																								
Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Alu- min- (Al)	Iron (Fe)	Man- gan- ese (Mn)	Cal- cium (Ca)	Mag- nes- ium (Mg)	Sodium (Na)	Pot- as- sium (K)	Lith- ium (Li)	Bi- car- bon- ate (HCO <sub>3</sub> )	Sul- fate (SO <sub>4</sub> )	Chloride (Cl)	Fluo- ride (F)	Ni- trate (NO <sub>3</sub> )	Phos- phor- us (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		Specific conduct- ance (micro- mhos at 25°C)	pH	Col- or	Oxygen consumed		
																	Cal- cium, mag- nesium	Non- cal- cium, mag- nesium						
Apr. 8, 1964.	823	--	--	1.2	0.01	--	--	--	--	--	--	--	--	--	--	0.23	--	--	--	--	--	4	6	
Apr. 16.....	96	--	--	--	--	--	68	0	159	--	--	--	78	0.2	43	--	490	262	206	--	754	7.7	--	--
Apr. 22.....	6430	--	--	--	--	--	63	0	49	--	--	--	11	1	10	--	181	105	54	--	262	7.2	--	--
Apr. 1-30....	1160	--	--	--	--	--	91	0	113	--	--	--	37	1	15	--	334	201	127	--	515	7.6	--	--
May 2.....	755	--	--	--	--	--	92	0	90	--	--	--	24	3	7.8	--	280	270	194	--	424	7.1	--	--
May 7.....	109	--	--	.46	.05	--	--	--	--	--	--	--	82	4	54	--	.39	522	246	236	--	772	6.7	5
May 30.....	72	--	--	--	--	--	13	0	159	--	--	--	8	17	1	--	370	212	139	--	583	7.7	--	--
May 1-31....	236	--	--	--	--	--	102	0	114	--	--	--	42	3	1	--	544	266	168	--	820	8.0	--	--
June 1.....	48	--	--	--	--	--	119	0	171	--	--	--	82	5	19	--	.96	696	248	141	--	1140	8.0	4
June 2.....	45	--	--	.67	.07	--	131	0	167	--	--	--	152	4	47	--	618	258	164	--	973	7.4	--	--
June 13.....	25	--	--	--	--	--	115	0	158	--	--	--	115	5	35	--	--	--	--	--	--	--	--	--
June 1-30....	36.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July 1.....	16	--	--	.10	.00	--	37	0	175	--	--	--	140	5	61	--	.41	598	208	178	--	1020	6.4	15
July 29.....	11	--	--	--	--	--	3	0	262	--	--	--	230	1	63	--	--	846	272	269	0	1460	5.2	16
July 1-31....	12.8	--	--	--	--	--	29	0	219	--	--	--	218	7	64	--	--	754	248	224	--	1370	6.2	--
Aug. 5.....	59	--	--	--	--	--	79	0	182	--	--	--	300	8	1.4	--	897	223	159	--	1610	6.4	--	--
Aug. 13.....	34	--	--	.13	.04	--	49	0	147	--	--	--	78	0	18	--	1.7	446	222	182	--	746	6.9	12
Aug. 22.....	47	--	--	--	--	--	2	0	179	--	--	--	176	5	58	--	--	690	246	245	1	1180	5.1	--
Aug. 1-31....	24.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sept. 7.....	2.3	--	--	--	--	--	36	0	282	--	--	--	70	1	0	--	--	620	216	187	--	895	6.5	--
Sept. 18.....	9.6	18	--	--	--	--	163	0	256	--	--	--	312	1	28	--	--	938	220	86	--	1910	7.1	--
Sept. 22.....	11	--	--	.15	.23	--	175	67	272	--	--	--	205	6	1.1	33	--	900	146	0	--	1670	8.9	38
Sept. 1-30....	9.0	14	--	--	--	--	88	0	252	--	--	--	235	1	25	--	--	784	234	162	--	1570	6.8	41

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
4-2005. BLACK RIVER AT ELYRIA, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	CHEMICAL ANALYSES, in parts per million, water, per gallon, 100 cc. of water						
	Dissolved oxygen		Organics		Ammonia nitrogen as NH <sub>4</sub>	Nitrite (NO <sub>2</sub> )	Cyanide (CN)
	Parts as million	Percent saturation	Phenols as C <sub>6</sub> H <sub>5</sub> OH	Alkyl benzene sulfonate (ABS)			
Nov. 4, 1963.....	6.7	24		0.6			0
Dec. 5.....	2.1	49		.9			20
Jan. 8, 1964.....	7.8	61		1.0			30
Feb. 7.....	--	88		.8			15
Mar. 11.....	10.4	77		.1			--
Apr. 8.....	8.6	76		.1			110
May 7.....	--	--		.1			70
June 2.....	7.0	74		.2			10
July 1.....	3.2	36		.3			15
Aug. 13.....	3.2	35		.4			8
Sept. 2.....	2.0	23		.5			20
Sept. 22.....							15
							M-2
							M-4
							0
							8
							M-16
							C-2

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement usually between 1300 and 1600)

[illegible]

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4--2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO

LOCATION.--At gaging station on right bank at highway 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 1964.

EXTREMES, 1948-64.--Water temperatures: Maximum 81°F June 23, 24, July 19-21, 26, 27; minimum 33°F Feb. 5, 6.

Sediment concentrations: Maximum daily, 1,780 ppm Mar. 5; minimum daily, 9 (estimated) ppm Oct. 13, Nov. 13, 17, 18.

EXTREMES, 1948-49, 1950-64.--Water temperatures (1948-49, 1952-64): Maximum, 88°F Aug. 18, 1949; minimum, freezing point on many days during winter months.

Sediment concentrations (1950-64): Maximum daily, 4,800 ppm Aug. 21, 1960; minimum daily, 1 ppm Sept. 4, 10, 1955.

Sediment loads (1950-64): Maximum daily, 51,400 tons Mar. 5, 1964; minimum daily, less than 0.5 ton on several days during August and September 1954, and September 1955.

REMARKS.--Diurnal fluctuations caused by powerplants above station. Flow affected by ice Jan. 13-18.

Temperature (°F) of water, water year October 1963 to September 1964

(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	64	64	64	65	65	64	63	64	64	64	62	61	61	61	60	60	60	59	59	58	58	58	57	57	57	57	57	56	57	57	56	60
Maximum	64	64	64	64	64	63	63	63	63	64	62	61	61	61	60	60	60	59	59	58	58	58	57	57	57	57	56	57	57	56	59	
Minimum	63	63	64	64	64	63	63	64	62	61	61	60	59	58	58	58	57	57	57	57	57	57	57	57	57	56	56	56	56	56	59	
November	56	57	57	56	56	56	54	54	54	53	53	52	52	52	51	51	49	48	49	48	47	47	47	47	47	47	44	44	43	43	--	50
Maximum	56	57	57	56	56	56	54	54	54	53	53	52	52	52	51	51	49	48	49	48	47	47	47	47	47	47	44	44	43	43	--	50
Minimum	56	56	55	55	56	54	54	54	52	52	52	52	51	51	49	48	46	47	48	46	46	45	46	46	46	44	44	43	42	43	--	50
December	43	43	42	42	41	42	41	38	39	39	39	39	40	40	40	40	40	41	41	41	41	41	40	40	40	39	39	40	41	42	42	41
Maximum	43	43	42	42	41	42	41	38	39	39	39	40	40	40	40	40	40	41	41	41	41	41	40	40	40	39	39	40	41	42	42	41
Minimum	43	42	41	41	40	38	37	38	39	39	39	40	40	40	40	40	40	41	41	41	40	40	40	40	40	39	39	40	41	41	40	40
January	41	40	39	38	38	37	38	38	38	39	39	39	39	39	39	39	38	38	37	36	35	36	36	34	34	35	35	36	37	36	35	37
Maximum	41	40	39	38	38	37	37	37	37	37	37	37	38	38	38	38	37	35	35	35	34	34	34	34	34	35	35	36	37	36	35	37
Minimum	40	39	37	37	37	37	37	37	37	37	37	38	38	38	38	37	35	35	35	34	34	34	34	34	34	35	35	36	34	34	36	36
February	35	35	36	36	34	34	35	36	36	36	36	36	35	36	37	36	37	38	38	38	38	39	40	39	41	39	40	41	40	--	--	37
Maximum	35	35	36	36	34	34	35	36	36	36	36	36	35	36	37	36	37	38	38	38	38	39	40	39	41	39	40	41	40	--	--	36
Minimum	35	35	34	34	33	33	34	35	36	36	35	35	35	36	36	37	36	37	38	37	38	39	39	39	39	39	39	39	39	--	--	36
March	40	39	40	39	41	41	40	41	41	42	43	43	43	42	42	43	45	46	46	46	46	47	46	45	48	47	48	49	49	50	44	44
Maximum	40	39	40	39	41	41	40	41	41	42	43	43	43	42	42	43	45	46	46	46	46	47	46	45	48	47	48	49	49	50	44	44
Minimum	39	39	38	38	39	39	39	39	40	41	42	42	41	41	41	41	42	45	44	45	46	45	45	45	45	45	45	46	46	49	49	43

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Temperature (°F) of water, water year October 1983 to September 1984--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			
April	51	50	50	52	51	50	49	52	54	53	54	54	53	54	55	57	56	57	58	59	60	59	61	62	62	63	63	63	63	66	--	56	
Maximum	49	49	48	50	48	48	49	52	52	52	52	52	52	54	54	55	56	57	58	59	59	59	61	61	62	62	62	63	63	--	55		
Minimum	67	66	67	66	68	69	69	69	69	68	68	68	68	68	67	68	69	69	73	73	73	73	74	74	74	71	71	71	68	66	69		
May	64	64	66	66	66	69	69	69	69	68	68	68	68	66	66	67	68	69	70	67	69	72	73	71	69	69	68	66	65	65	68		
Maximum	65	65	65	66	67	67	68	71	76	76	73	74	77	77	76	71	73	77	77	77	79	81	81	81	81	81	81	77	79	79	74		
Minimum	65	65	65	65	65	67	67	67	68	71	75	71	70	70	74	76	71	69	69	73	74	77	77	77	73	73	75	75	77	78	--	72	
June	80	79	80	79	75	76	75	74	75	76	75	74	70	70	71	74	78	80	81	81	80	78	78	78	81	81	80	79	77	76	77		
Maximum	78	77	78	75	72	72	74	73	73	72	73	70	68	68	68	70	74	76	77	78	79	74	76	75	76	78	78	76	74	72	74		
Minimum	75	74	74	75	75	75	75	73	73	73	73	69	65	65	66	68	69	69	69	66	68	69	71	71	72	72	74	76	76	78	74		
August	73	74	73	73	73	73	73	70	70	69	65	64	64	64	66	68	67	66	65	65	65	68	69	70	69	70	74	74	76	70	70		
Maximum	77	74	74	75	73	74	74	74	74	75	74	70	67	66	64	64	64	64	64	65	67	67	67	66	62	61	60	60	60	--	68		
Minimum	74	71	72	73	71	70	71	72	73	70	67	65	64	64	64	63	64	64	63	63	65	67	65	62	61	60	59	59	58	--	66		

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Suspended sediment, water year October 1963 to September 1964  
(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..	128		3	404	156	S 190	156	32	13
2..	156		15	318	116	100	122	27	9
3..	118		5	185	--	35	122	27	9
4..	107		4	118	--	10	119	28	9
5..	105		4	130	--	5	114	28	9
6..	101		4	159	--	6	111	29	9
7..	101		4	141	--	6	106	29	8
8..	152		25	137	--	6	113	30	9
9..	113		5	137	--	6	192	--	25
10..	107		3	118	--	5	161	44	19
11..	101		3	130	--	9	132	42	15
12..	101		3	114	--	3	126	40	14
13..	99		2	111	--	3	128	38	13
14..	89		2	107	--	3	105	39	11
15..	100		3	107	--	3	99	40	11
16..	101		3	109	--	3	95	40	10
17..	99		3	109	--	3	105	40	11
18..	101		3	107	--	3	99	40	11
19..	99		3	120	--	3	106	42	12
20..	97		3	113	--	3	109	44	13
21..	91		2	113	--	3	113	45	14
22..	100		3	114	--	3	107	45	13
23..	103		3	113	--	3	99	45	12
24..	108		3	111	--	3	105	45	13
25..	109		3	105	--	3	103	45	12
26..	107		3	105	--	3	96	42	11
27..	105		3	109	--	3	105	41	12
28..	96		2	112	--	4	107	40	12
29..	114		5	118	--	5	100	40	11
30..	120		6	210	--	30	96	40	10
31..	106		3	--	--	--	120	52	17
Total	3334		136	4183	--	465	3571	--	377
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..	119	--	16	507	46	63	221	67	40
2..	126	--	14	448	35	42	361	185	A 180
3..	125	--	14	364	43	42	994	800	A 2100
4..	232	--	50	314	48	41	2680	1580	S 18300
5..	161	65	28	293	40	32	10700	1780	51400
6..	148	56	22	404	86	S 119	5660	560	8560
7..	185	52	26	610	94	155	4250	460	5280
8..	165	50	22	454	30	37	3890	445	4670
9..	228	--	35	398	34	36	5810	872	S 14400
10..	392	--	95	345	42	39	8540	788	18200
11..	246	--	35	302	41	33	7150	308	5940
12..	176	--	20	275	53	39	5180	294	4110
13..	130	--	25	275	47	35	4100	296	3280
14..	140	--	25	269	35	25	3250	285	2500
15..	130	--	20	229	32	20	2920	279	2200
16..	130	--	18	218	42	25	2110	235	1340
17..	130	--	18	202	42	23	1660	200	896
18..	140	45	17	215	36	21	1320	157	560
19..	150	45	18	208	23	13	1120	130	393
20..	310	--	85	218	32	18	980	105	278
21..	590	--	260	205	39	22	1020	182	S 647
22..	546	--	190	185	39	19	1260	152	517
23..	563	127	193	167	34	15	1050	85	241
24..	730	--	280	161	35	15	890	69	166
25..	957	--	440	172	52	24	880	72	171
26..	882	--	440	202	62	34	1040	68	191
27..	734	--	320	202	47	26	820	71	157
28..	722	--	270	178	43	21	696	74	139
29..	702	--	220	188	58	29	640	70	121
30..	646	--	160	--	--	--	616	57	95
31..	566	72	110	--	--	--	624	45	76
Total	11201	--	3486	8208	--	1063	82432	--	147148

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Suspended sediment, water year October 1963 to September 1964--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..	582	50	78	1240	107	358	218	14	8
2..	804	175	388	1034	94	262	220	14	8
3..	4600	668	8300	957	98	243	200	16	9
4..	2880	340	2640	926	112	280	202	22	12
5..	2210	212	1260	844	78	178	182	27	13
6..	2220	203	1220	740	56	112	177	32	15
7..	2710	--	1700	676	59	108	245	--	25
8..	2050	--	1300	656	76	135	210	--	12
9..	1710	--	1100	624	62	104	188	22	11
10..	1520	--	1000	450	55	67	182	22	11
11..	1320	138	492	392	35	37	129	21	7
12..	1150	42	130	376	26	26	134	18	6
13..	1020	89	245	360	28	25	140	17	6
14..	939	80	203	1920	700	3600	147	15	6
15..	796	49	105	1040	--	700	155	15	6
16..	704	49	93	688	144	267	348	--	80
17..	660	28	50	672	79	143	184	--	16
18..	600	--	75	640	84	145	155	--	12
19..	876	230	550	530	60	86	182	--	18
20..	1450	750	2900	478	40	52	143	--	85
21..	4330	1410	19000	405	30	33	245	31	20
22..	8670	970	22700	392	27	28	184	22	11
23..	6050	362	5910	303	26	21	158	17	7
24..	3810	300	3090	357	30	35	294	--	70
25..	2890	233	1820	551	--	260	212	33	19
26..	2390	164	1060	327	60	55	166	36	16
27..	1980	124	663	342	28	26	149	37	15
28..	2020	115	627	256	24	16	125	37	12
29..	1570	125	530	242	17	11	102	38	10
30..	1460	123	485	225	19	12	117	40	13
31..	--	--	--	202	18	10	--	--	--
Total	65971	--	79714	18841	--	7435	5493	--	559
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..	112	42	13	109	--	6	108	26	8
2..	110	42	12	114	--	7	100	25	7
3..	129	--	25	275	--	190	100	25	7
4..	205	--	50	324	--	340	99	23	6
5..	103	--	12	160	--	29	96	28	7
6..	87	--	8	142	--	14	89	30	7
7..	100	--	10	130	--	10	73	26	5
8..	104	--	10	125	--	10	77	26	5
9..	100	--	10	110	--	9	95	24	6
10..	93	--	8	89	--	7	99	22	6
11..	89	--	7	115	--	14	96	22	6
12..	99	--	11	386	450	450	95	20	5
13..	379	--	320	215	--	130	88	20	5
14..	169	191	87	267	364	307	74	17	3
15..	327	--	250	147	69	27	88	19	4
16..	264	75	55	118	74	24	92	19	5
17..	195	46	24	98	72	19	92	20	5
18..	153	43	18	136	48	18	95	22	6
19..	120	36	12	115	34	10	103	19	5
20..	103	40	11	114	24	7	115	19	6
21..	124	44	15	309	349	388	96	21	5
22..	593	750	1200	379	200	200	124	22	7
23..	202	--	55	360	--	350	142	77	45
24..	177	60	30	153	68	28	104	43	12
25..	177	--	20	151	48	20	95	27	7
26..	132	--	7	228	53	33	94	23	6
27..	109	--	6	155	53	22	90	23	6
28..	138	--	7	140	46	17	89	20	5
29..	173	--	9	138	43	16	95	18	5
30..	140	--	8	120	37	12	115	16	5
31..	120	--	7	100	31	8	--	--	--
Total	5126	--	2317	5522	--	2722	2918	--	217
Total discharge for year (cfs-days).....									
Total load for year (tons).....									216800
									245639

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.



## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-2085.1. CUYAHOGA RIVER AT CLEVELAND, OHIO

LOCATION.--At bridge on Center Street in Cleveland, Cuyahoga County, 0.8 mile upstream from mouth and 3.8 miles downstream from Kingsbury Run.

DRAINAGE AREA.--813 square miles at mouth.

RECORDS AVAILABLE.--Chemical analyses: October 1950 to February 1952, May to September 1964.

Water temperatures: March 1950 to February 1952, May to September 1964.

EXTREMES, May to September 1964.--Specific conductance: Maximum daily, 1,410 micromhos Sept. 20; minimum daily, 380 micromhos July 30.

Water temperatures: Maximum, 94°F July 22; minimum, not determined.

EXTREMES, 1950-52, 1964.--Specific conductance: Maximum daily, 1,410 micromhos Sept. 20, 1964; minimum daily, 256 micromhos Jan. 27, 1952.

Water temperatures: Maximum, 94°F July 22, 1964; minimum, 39°F Dec. 9, 1950, Feb. 14, 1951, Jan. 29, 1952.

Data from continuous recorder, May to September 1964

Day	APRIL								MAY							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1..									630	610	--	--	3.5	2.3	--	--
2..									690	620	--	--	3.0	1.7	--	--
3..									720	660	--	--	3.0	.6	--	--
4..									730	640	--	--	2.7	.2	--	--
5..									700	590	--	--	2.1	.0	--	--
6..									790	680	--	--	--	--	--	--
7..									--	--	--	--	--	--	--	--
8..									--	--	--	--	--	--	--	--
9..									--	--	--	--	--	--	--	--
10..									--	--	--	--	--	--	--	--
11..									--	--	--	--	--	--	--	--
12..									--	--	--	--	--	--	--	--
13..									--	--	--	--	--	--	--	--
14..									--	--	--	--	--	--	--	--
15..									640	590	7.1	6.9	3.1	2.4	--	--
16..									750	600	6.9	6.7	3.3	2.0	--	--
17..									860	750	6.7	6.6	2.1	1.3	--	--
18..									850	800	7.0	6.7	1.6	1.1	--	--
19..									820	760	7.2	7.0	2.1	.0	75	73
20..									840	750	7.1	6.7	.0	.0	76	73
21..									920	760	6.8	6.6	.1	.0	77	71
22..									990	770	6.9	6.5	2.5	.0	78	70
23..									990	770	6.9	6.5	2.5	.0	78	70
24..									960	770	6.8	6.5	2.4	.0	81	70
25..									980	810	7.2	6.7	.7	.0	81	74
26..									810	640	7.2	7.0	1.4	.1	76	72
27..									820	610	7.1	6.8	1.8	.1	77	72
28..									940	690	6.9	6.5	2.1	.3	78	73
29..									1020	840	6.8	6.3	2.2	.3	79	72
30..									1020	840	6.8	6.3	2.9	.3	79	72
31..									--	--	--	--	--	--	--	--
JUNE								JULY								
1..	1000	800	6.8	6.6			76	72	960	790	7.4	6.8	0.1	0.0	91	83
2..	1070	770	6.9	6.8			76	72	850	750	7.7	7.3	--	--	91	90
3..	1020	890	7.0	6.9			76	72	770	600	7.7	7.6	--	--	90	87
4..	1110	830	7.0	6.8			76	70	--	--	--	--	--	--	--	--
5..	1190	910	6.9	6.6			81	70	--	--	--	--	--	--	--	--
6..	1190	910	6.9	6.6			81	70	--	--	--	--	--	--	--	--
7..	1190	910	6.9	6.6			81	70	900	830	7.1	6.9	--	--	84	82
8..	1190	910	6.9	6.6			81	70	1000	810	7.0	6.8	--	--	87	82
9..	1000	910	7.0	6.8			77	70	1050	900	6.8	6.6	--	--	88	82
10..	990	860	--	--			78	73	980	810	6.8	6.6	--	--	86	80
11..	1000	900	--	--			79	74	--	--	--	--	--	--	--	--
12..	1120	900	--	--			86	75	--	--	--	--	--	--	--	--
13..	1120	900	--	--			86	75	--	--	--	--	--	--	--	--
14..	1120	900	--	--			86	75	--	--	--	--	--	--	--	--
15..	1120	900	--	--			86	75	--	--	--	--	--	--	--	--
16..	1250	1050	--	--			87	78	960	820	6.7	6.5	--	--	84	81
17..	1250	1050	6.9	6.4			86	78	970	800	6.7	6.4	--	--	86	80
18..	1140	890	6.8	6.6			82	77	940	700	6.6	6.4	--	--	86	80
19..	1190	780	6.8	6.6			88	76	950	650	6.6	6.3	--	--	87	82
20..	1190	780	6.8	6.6			88	76	930	780	6.7	6.4	--	--	91	84
21..	1190	780	6.8	6.6			88	76	900	720	7.0	6.7	--	--	90	83
22..	1190	780	6.8	6.6			88	76	1020	800	6.9	6.6	--	--	94	84
23..	890	770	7.0	6.9			86	79	980	800	6.8	6.5	--	--	93	85
24..	980	760	7.0	6.9			87	79	980	800	6.7	6.5	--	--	90	85
25..	1040	900	7.0	6.7			88	82	970	810	6.7	6.5	--	--	92	86
26..	1090	820	6.9	6.6			88	81	900	750	6.7	6.5	--	--	90	86
27..	1090	820	6.9	6.6			88	81	920	680	6.7	6.5	--	--	90	86
28..	1090	820	6.9	6.6			88	81	980	750	6.8	6.5	1.8	.0	93	84
29..	1090	820	6.9	6.6			88	81	950	700	6.8	6.5	.4	.1	92	81
30..	990	810	6.8	6.6			88	82	720	380	7.0	6.8	.2	--	81	80
31..	--	--	--	--			--	--	660	430	7.1	7.0	--	--	80	78



## QUALITY OF SURFACE WATERS, 1964

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-2085.1. CUYAHOGA RIVER AT CLEVELAND, OHIO--Continued

## Data from continuous recorder, May to September 1964--Continued

Day	AUGUST										SEPTEMBER							
	Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)		Specific conductance (micromhos at 25°C)		pH		Dissolved oxygen (ppm)		Temperature (°F)			
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min		
1..	870	590	--	--			--	--	1000	880	6.7	6.6	--	--	--	--		
2..	1060	660	--	--			--	--	990	810	6.8	6.7	--	--	--	--		
3..	1120	850	6.8	6.6			90	86	1040	800	6.9	6.7	--	--	--	--		
4..	1150	950	6.8	6.6			91	87	1070	850	6.9	6.7	--	--	--	--		
5..	1130	950	6.8	6.7			90	85	1120	870	6.9	6.8	--	--	--	--		
6..	1120	900	6.8	6.7			88	85	1060	910	6.9	6.8	--	--	--	--		
7..	1120	850	6.8	6.6			88	83	1100	870	6.9	6.7	--	--	--	--		
8..	1100	860	6.8	6.4			89	84	1170	900	6.8	6.6	--	--	--	--		
9..	1090	900	6.6	6.4			88	85	1050	800	--	--	--	--	--	--		
10..	1060	910	6.7	6.5			86	84	1170	850	--	--	--	--	--	--		
11..	1100	800	6.8	6.5			88	82	1100	830	--	--	--	--	--	--		
12..	1260	1100	6.8	6.6			91	86	1230	960	--	--	--	--	--	--		
13..	1260	940	6.8	6.6			90	81	1200	1000	--	--	--	--	--	--		
14..	1090	900	6.6	6.5			84	81	1250	1000	--	--	--	--	--	--		
15..	1090	810	6.6	6.3			81	79	1250	900	--	--	--	--	--	--		
16..	1050	900	6.4	6.3			80	78	1250	990	--	--	--	--	--	--		
17..	970	810	6.6	6.3			81	78	1400	1050	--	--	--	--	--	--		
18..	990	800	6.6	6.4			85	79	1340	1060	--	--	--	--	--	--		
19..	1050	860	6.6	6.5			86	81	1370	1060	--	--	--	--	--	--		
20..	1070	850	6.7	6.6			85	80	1410	1140	--	--	--	--	--	--		
21..	1260	910	6.7	6.4			89	81	1400	1060	--	--	--	--	--	--		
22..	1250	890	6.6	6.3			89	83	1250	1000	--	--	--	--	--	--		
23..	990	810	6.6	6.4			--	--	1240	950	--	--	--	--	--	--		
24..	900	750	6.6	6.6			--	--	1280	950	--	--	--	--	--	--		
25..	910	760	6.7	6.6			--	--	1250	940	--	--	--	--	86	78		
26..	900	800	6.8	6.6			--	--	1150	890	--	--	--	--	80	76		
27..	960	800	6.7	6.6			--	--	1000	810	--	--	--	--	78	75		
28..	990	680	6.8	6.5			--	--	1150	900	--	--	1.3	0.2	--	--		
29..	1040	750	6.7	6.5			--	--	1160	770	--	--	1.6	.0	--	--		
30..	1100	840	6.7	6.5			--	--	--	--	--	--	--	--	--	--		
31..	1060	860	6.7	6.5			--	--	--	--	--	--	--	--	--	--		

## STREAMS TRIBUTARY TO LAKE ERIE--Continued

## 4-2122. GRAND RIVER AT PAINESVILLE, OHIO

LOCATION.--at bridge on State Highway 535 in Painesville, Lake County, 2.2 miles upstream from mouth, and 8 miles downstream from Kellogg Creek.

RECORDS AVAILABLE.--Chemical analyses: March 1950 to February 1952, October 1962 to September 1964.

Water temperatures: March 1950 to February 1952, October 1962 to September 1964.

EXTREMES, 1963-64.--Specific conductance: Maximum daily, 30,300 micromhos July 14; minimum daily, 434 micromhos Mar. 6.

Water temperatures: Maximum, 89°F July 23, 29; minimum, 34°F Jan. 12-17.

EXTREMES, 1950-52, 1962-64.--Specific conductance: Maximum daily, 30,300 micromhos July 14, 1964; minimum daily, 309 micromhos Dec. 8, 1950.

Water temperatures: Maximum, 89°F July 23, 29, 1964; minimum, freezing point on several days during winter months.

REMARKS.--Samples collected for iron and manganese filtered clear when collected. Values expressed in parts per million should be multiplied by the density,

where given, when computing loads. Records of specific conductance of daily samples available in district office at Columbus, Ohio. Samples were analyzed

on the following basis: (1) Maximum daily specific conductance for each month, (2) minimum daily specific conductance for each month, (3) special sample

each month to further define quality of water, and (4) composite analysis of all daily samples for each month. Diamond Alkali Company and Painesville Sewage

Disposal Plant are located just above station. Records of discharge are given for Grand River near Madison.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		To-Specific conductance (micro-mhos at H <sup>+</sup> 25°C)	pH	Color	Oxygen consumed			
																	Calcium, magnesium	Non-carbonate				Unfiltered			
Oct. 2, 1963.	1.7										98	0	79	3450	0.0		6340	2990	2910	10100	6.5				
Oct. 29, .....	4.0										56	0	120	6720	.1		11500	5850	5800	18200	6.2				
Oct. 1-31, ....	.8										76	0	91	4490	.0		8410	4110	4050	13400	6.4				
Nov. 1, .....	5.1										75	0	145	6720	.0		11600	5800	5740	18200	7.4				
Nov. 4, .....	18										88	0	99	1250	.1	0.14	2450	1280	1210	4180	7.0		8	8	
Nov. 19, .....	121			0.08	0.05						85	0	114	4120	.0		7130	3620	3570	11700	6.6				
Nov. 1-30, ....	58.4																								
Dec. 1, .....	300										7	31	171	8350	.4		15100	8030	7970	22600	8.6				
Dec. 6, .....	121			.15	.34						66	0	91	1350	.2		3190	1450	1400	4570	7.3		7	6	
Dec. 11, .....	338										65	0	112	3250	.2		5830	3060	3010	9780	6.5				
Dec. 1-31, ....	153																								
Jan. 2, 1964.	90										60	0	92	3100	.1	10	6210	2680	2630	9100	6.7				
Jan. 9, .....	400			.09	.19						60	0	40	209	.2	5.4	.47	596	265	216	886	6.7		5	5
Jan. 23, .....	1300										54	0	53	1213	.1		2890	1180	1130	3980	6.5				
Jan. 1-31, ....	734																								
Feb. 7, .....	650			.12	.05						62	0	67	700	.3	3.8	.16	1920	714	663	2550	6.7		2	4
Feb. 9, .....	550										72	0	112	3750	.2										
Feb. 21, .....	110										65	0	90	2250	.2										
Feb. 1-29, ....	251										75	0	90	2250	.2										

## STREAMS TRIBUTARY TO LAKE ERIE—Continued

4-2122. GRAND RIVER AT PAINESVILLE, OHIO—Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964—Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		Toxicity (micro-inches at 25°C)	pH	Col- or	Oxygen consumed
																Non- calcium, mag- nesium	acid, bon- ate				
Mar. 1, 1964.	100		--	--						110	0	112	0.4	--	--	6710	3630	10800	6.1	--	--
Mar. 6, .....	11400		--	--						42	0	28	.1	5.0	--	332	149	434	6.2	--	--
Mar. 11, .....	6100		0.57	0.05						57	0	78	.1	2.6	--	--	--	2510	6.3	4	5
Mar. 1-31, .....	2867		--	--						--	--	--	--	--	--	1660	745	--	--	--	--
Apr. 9, .....	2190		.91	.00						--	--	--	--	--	--	--	--	--	--	4	5
Apr. 19, .....	278		--	--						43	0	80	.0	3.8	--	4040	1650	5670	7.5	--	--
Apr. 23, .....	5410		--	--						40	0	36	.1	2.7	--	449	182	607	7.6	--	--
Apr. 1-30, .....	1842		--	--						53	0	59	.4	5.8	--	1910	708	2480	7.5	--	--
May 1, .....	3130		--	--						30	0	58	.3	3.9	--	576	272	900	6.5	--	--
May 7, .....	300		.19	.16						--	--	--	--	--	--	--	--	7060	--	6	--
May 24, .....	152		--	--						64	0	61	.2	6.4	--	2450	1160	3940	7.0	--	--
May 1-31, .....	582		--	--						--	--	--	--	--	--	--	--	--	--	--	--
June 2, .....	47		.15	.14						--	--	--	--	--	--	--	--	--	--	6	--
June 13, .....	40		--	--						91	0	84	.2	--	--	4280	1910	6430	7.7	--	--
June 24, .....	44		--	--						68	0	100	.2	--	--	6590	3380	10399	6.8	--	--
June 1-30, .....	36.1		--	--						45	0	92	.2	--	--	5380	2370	8140	6.9	--	--
July 1, .....	14		.07	.04						--	--	--	--	--	--	--	--	--	--	6	7
July 10, .....	13		--	--						72	0	92	.2	--	--	4500	1960	6740	7.1	--	--
July 14, .....	29		--	--						0	20	139	.4	--	--	21000	11200	30300	9.6	--	--
July 1-31, .....	20.5		--	--						48	0	112	.3	--	--	8320	4250	12900	7.1	--	--
Aug. 4, .....	14		--	--						55	0	84	.0	--	--	8790	4500	12900	9.2	--	--
Aug. 7, .....	17		--	--						32	0	124	.1	--	--	5780	2700	9050	7.1	--	--
Aug. 13, .....	11		.00	.03						--	--	--	--	--	--	--	--	11000	7.2	6	6
Aug. 1-31, .....	18.8		--	--						52	0	108	.1	--	--	7000	3450	--	--	--	--
Sept. 1, .....	21		--	--						31	0	72	.2	--	--	5790	2660	8640	6.9	--	--
Sept. 21, .....	2.3		--	--						93	0	98	.3	--	--	10400	5160	15100	6.7	--	--
Sept. 22, .....	3.5		.07	.18						51	0	216	.7	--	--	8700	4400	13400	6.6	--	--
Sept. 1-30, .....	8.9		--	--						48	0	106	.3	--	--	7550	4680	11500	6.7	--	--

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
4-2122. GRAND RIVER AT PAINESVILLE, OHIO--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued										
Date of collection	Dissolved oxygen		Organics		Ammonia nitrogen as $\text{NH}_4$	Nitrite ( $\text{NO}_2$ )	Turbidity	Density at 20°C	Threshold odor	
	Parts per million	Percent saturation	Phenols $\text{C}_6\text{H}_5\text{OH}$	Alkyl benzene sulfonate (ABS)						
Oct. 29, 1963.....	--	--		--			--	1.005	--	
Oct. 1-31.....	--	--		--			--	1.003	--	
Nov. 1.....	--	--		--			--	1.006	--	
Nov. 4.....	7.1	76		0.6			20	--	Cm-32	
Nov. 1-30.....	--	--		--			--	1.002	--	
Dec. 1.....	--	--		--			--	1.008	--	
Dec. 6.....	10.0	84		.4			20	--	M-4	
Jan. 2, 1964.....	--	--		--	0.0		220	--	DS-8	
Jan. 9.....	10.1	75		.2			--	1.002	--	
Feb. 7.....	--	--		.1			--	--	--	
Feb. 21.....	--	--		--			140	--	M-1	
Mar. 11.....	11.6	88		.1			90	--	C-2	
Apr. 9.....	9.7	82		.1			10	--	Cm-8	
May 7.....	--	--		.2			6	--	Cm-16	
June 2.....	8.0	85		.4			4	--	--	
July 1.....	6.4	85		.4			--	1.011	--	
July 14.....	--	--		--			--	1.003	--	
July 1-31.....	--	--		--			--	--	--	
Aug. 4.....	--	--		--			--	1.002	--	
Aug. 13.....	6.4	79		.5			7	--	Cm-4	
Aug. 1-31.....	--	--		--			--	1.002	--	
Sept. 21.....	--	--		--			--	1.004	--	
Sept. 22.....	5.4	67		.5			15	--	Cm-4	
Sept. 1-30.....	--	--		--			--	1.002	--	

STREAMS TRIBUTARY TO LAKE ERIE--Continued  
 4-2122. GRAND RIVER AT PAINESVILLE, OHIO--Continued  
 Temperature (°F) of water, water year October 1963 to September 1964  
 (Once-daily measurement usually between 0800 and 1600)

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	
October.....	76	75	72	72	76	75	77	76	75	77	74	76	75	76	75	77	77	78	77	78	78	76	75	78	78	80	79	70	70	68	76		
November.....	65	63	62	62	53	68	65	66	66	63	65	63	40	61	45	47	50	50	54	57	65	65	60	58	60	58	60	60	62	50	--	58	
December.....	45	43	47	40	45	48	47	46	48	37	48	38	41	42	42	43	44	43	42	44	44	43	43	42	42	41	40	38	38	39	42	40	
January.....	38	39	40	40	38	38	39	39	38	37	35	36	34	36	34	34	34	35	37	39	37	35	35	35	35	35	35	35	35	36	36	36	
February.....	38	38	37	37	38	37	36	37	36	36	35	36	37	39	41	62	43	42	42	42	42	42	42	42	43	42	43	43	43	--	--	40	
March.....	64	43	38	35	38	38	38	38	38	38	38	38	40	40	42	43	43	42	42	42	42	42	39	42	45	42	42	42	42	41	40	41	
April.....	62	40	42	42	43	43	44	45	44	48	49	52	53	55	54	57	57	58	52	56	52	54	55	58	55	55	60	58	55	--	51	--	
May.....	58	58	59	60	60	65	70	--	60	63	62	58	63	63	60	62	63	64	70	68	68	70	74	76	--	68	71	70	69	72	65	--	
June.....	72	69	68	69	70	73	73	75	78	75	74	75	76	78	77	73	74	77	79	80	82	82	83	82	83	82	83	82	82	84	85	--	77
July.....	87	88	85	87	85	85	85	82	83	82	86	84	83	78	83	80	84	85	86	86	86	87	89	88	87	88	88	89	88	85	86	85	
August.....	85	88	86	86	85	85	85	83	81	80	84	84	76	76	77	70	77	78	80	80	81	80	80	81	82	82	84	85	84	85	82	80	--
September.....	84	83	86	95	83	81	82	84	85	85	83	78	75	78	82	78	75	75	82	84	84	80	79	78	65	68	70	72	75	73	--	--	

## STREAMS TRIBUTARY TO LAKE ONTARIO

4-2216. VAN CAMPEN CREEK AT FRIENDSHIP, N. Y.

LOCATION.--At gaging station on left bank 45 feet downstream from Moss St. bridge in village of Friendship, Allegany County.

DRAINAGE AREA.--45.8 square miles.

RECORDS AVAILABLE.--Water temperatures: February to September 1964.

EXTREMES, February to September 1964.--Water temperatures: Maximum, 81°F July 1; minimum, freezing point Feb. 4 and Mar. 4, 5.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro- mhos at 25°C)	pH	Color
														Calcium	Non-carbonate			
Sept. 21, 1964.....	1.0		0.17	36	9.7	420		125	21	35		0.9		130	28	348	7.3	

A Calculated Na plus K, reported as Na.

Temperature (°F) of water, February to September 1964  
(Continuous ethyl alcohol-actuated thermometer)

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



## STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

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 1964,

EXTREMES, 1963-64.--Water temperatures: Maximum, 82°F July 2; minimum, 36°F on several days during December, January and March. EXTREMES, 1954-64.--Water temperatures: Maximum, 83°F Aug. 4-6, 1955; minimum, freezing point on several days in 1955, 1956, 1960 and 1963.

(Twice-daily measurements at approximately 1000 and 1600)

[illegible]

8



## STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

4-2375. SENECA RIVER AT BALDWINVILLE, N. Y.

LOCATION.--At lock 24, Baldwinsville, Onondaga County, 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 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 82°F. July 24; minimum, 33°F on several days during January and February.

EXTREMES, 1957-64.--Water temperatures: Maximum, 82°F. July 24, 1964; minimum, freezing point on many days during winter months.

REMARKS.--Stream frozen Dec. 21 to Jan. 5.

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement at approximately 0800)

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

## STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

4-2560. INDEPENDENCE RIVER AT DONNATTSBURG, N. Y.

LOCATION --Temperature recorder at gaging station on right bank at downstream side of highway bridge at Donnattsburg, Lewis County, 1.2 miles downstream from Chase Lake Outlet, 4.2 miles northeast of Glenfield, and 5 miles upstream from mouth.

DRAINAGE AREA --91.7 square miles.

RECORDS AVAILABLE --Water temperatures: October 1959 to September 1961, October 1963 to September 1964.

EXTREMES, 1963-64. --Water temperatures: Maximum, 74°F July 22, 23; minimum, freezing point on many days during February and March.

EXTREMES, 1959-61, 1963-64. --Water temperatures: Maximum, 80°F July 24, 1961; minimum, freezing point on many days during February and March each year.

Temperature (°F) of water, water year October 1963 to September 1964  
(Continuous ethyl alcohol-actuated thermometer)

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

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, 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 1964.  
EXTREMES, 1963-64.--Water temperatures: Maximum, 72°F July 24-29; minimum, 34°F Mar. 12, 13, 20.  
EXTREMES, 1958-64.--Water temperatures: Maximum, 74°F Sept. 10, 1959; minimum, 33°F on many days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement at approximately 0900)

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

STREAMS TRIBUTARY TO LAKE ONTARIO--Continued  
4-2605. BLACK RIVER AT WATERTOWN, N. Y.

LOCATION.--At dam at Watertown Municipal Powerplant, Watertown, Jefferson County, and about 1.6 miles upstream from gaging station.  
DRAINAGE AREA.--1,876 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1956.

Water temperatures: October 1955 to September 1959, July 1962 to September 1964.

EXTREMES, 1963-64.--Water temperatures: Maximum, 82°F July 28; minimum, 34°F on several days during February.

EXTREMES, 1958-59, 1962-64.--Water temperatures: Maximum, 82°F July 28, 1964; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1963 to September 1964  
(Once-daily measurement at approximately 0930)

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

## 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 1964.  
 EXTREMES, 1963-64.--Water temperatures: Maximum, 72°F July 23, 28, (p.m.), 29-31; minimum, freezing point on many days during  
 EXTREMES, 1955-64.--Water temperatures: Maximum, 75°F on several days during August and September 1959; minimum, freezing point on  
 many days during winter months.  
 REMARKS.--Stream frozen Jan. 1 to Mar. 31.

Temperature (°F) of water, water year October 1963 to September 1964 (Twice-daily measurements at approximately 0800 and 1800)																																	
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.	54	55	55	55	54	56	56	56	56	56	56	56	55	55	55	55	55	55	55	56	56	56	56	56	56	56	56	56	56	55	54	55	
p.m.	55	56	55	55	55	56	56	56	56	56	56	56	56	56	56	55	55	56	56	56	56	56	56	56	56	56	56	56	56	55	54	56	
November																																	
a.m.	54	54	52	50	49	49	49	50	49	50	50	49	48	49	48	48	48	48	48	48	48	48	48	48	48	47	47	47	47	46	46	49	
p.m.	54	53	51	49	50	50	49	50	49	50	50	49	49	49	48	48	48	48	48	48	48	48	48	48	48	47	47	47	47	46	45	49	
December																																	
a.m.	46	44	44	44	44	43	43	42	42	42	42	42	40	40	40	39	38	38	37	36	36	36	36	35	35	35	35	34	34	34	34	39	
p.m.	45	44	44	44	43	43	43	42	42	42	42	41	40	40	39	38	38	37	36	36	36	36	35	35	35	34	34	34	34	34	34	39	
January																																	
a.m.	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
p.m.	32	32	32	32	32	32	32	32	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																																	
a.m.	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
p.m.	32	32	32	32	32	32	32	32	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																																	
a.m.	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
p.m.	32	32	32	32	32	32	32	32	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																																	
a.m.	33	33	34	34	33	34	34	34	34	34	34	35	36	36	37	38	38	40	40	40	40	40	40	40	40	41	42	41	42	42	42	37	
p.m.	33	33	34	34	33	34	34	34	34	34	35	36	36	37	38	38	40	40	40	40	40	40	40	40	40	41	42	42	42	42	42	38	
May																																	
a.m.	43	43	44	45	46	47	46	48	48	49	50	50	50	50	50	50	50	50	50	50	50	50	50	50	52	53	53	54	54	54	54	49	
p.m.	43	43	44	45	46	47	46	48	48	49	50	50	50	50	50	50	50	50	50	50	50	50	50	51	52	53	53	54	54	54	54	50	
June																																	
a.m.	54	54	54	54	54	54	54	54	54	54	54	56	58	58	59	60	59	60	59	60	60	60	60	60	61	62	62	63	64	64	58	58	
p.m.	54	54	54	54	54	54	54	54	54	54	56	58	58	59	60	60	60	59	60	60	60	60	60	60	61	62	62	63	64	64	59	59	
July																																	
a.m.	65	65	65	66	66	66	66	66	66	66	66	68	68	68	68	67	68	68	69	70	69	70	70	70	71	72	72	72	72	72	72	68	
p.m.	65	66	66	66	66	66	66	66	66	66	68	68	68	68	67	68	69	70	70	70	70	70	71	72	72	72	72	72	72	72	72	69	
August																																	
a.m.	68	68	66	66	68	67	68	68	67	67	66	66	65	64	64	64	64	64	64	64	64	64	64	64	65	65	65	66	66	66	66	66	66
p.m.	69	68	67	68	68	68	68	67	67	66	66	65	64	64	64	64	64	64	64	64	64	64	64	64	65	65	65	66	66	67	66	67	66
September																																	
a.m.	66	66	67	67	67	66	66	66	67	68	68	66	66	66	66	65	64	64	64	63	63	63	64	64	64	63	62	62	61	60	59	65	
p.m.	67	68	67	67	67	66	66	67	68	68	66	66	66	66	65	64	64	64	63	63	63	64	64	64	63	62	62	61	60	59	65	65	

## MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carb. Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		Toxicity (micro-mhos at H <sup>+</sup> 25°C)	pH	Color	Turbidity	Loss on ignition	
																	Calcium, magnesium	Non-carbonate						
STREAMS TRIBUTARY TO LAKE MICHIGAN																								
4-583. WARNER CREEK NEAR PALMER, MICH.																								
Oct. 17, 1963	6.3	7.2				9.1	5.1	2.4	1.2		78	38	7.8	6.5				70	6	156	6.9	90	70	
Apr. 21, 1964	49														0.9		58	44	12	107	7.1		5	
4-964.20. FISHER CREEK NEAR QUINCY, MICH.																								
Apr. 15, 1964	5.19			--	--	101	26	6.3	1.9		245	140	14	--	--		469	359	158	683	6.8			
July 13, 1964	1.78	12		0.14	0.13	89	30	7.4	1.3		298	94	12	0.6	1.5		414	346	102	649	8.0	17		
July 29, 1964	1.17			.21	.04	--	--	--	--		199	88	12	.3	1.4	0.04	A321	256	92	501	8.1			
4-965.12. MUD CREEK AT COLDWATER, MICH.																								
Apr. 15, 1964											218	142	40				476	350	171	719	8.1	12	71	
July 29, 1964											299	47	38				A428	322	76	668	7.3			
4-965.3. HOG CREEK NEAR QUINCY, MICH.																								
Apr. 15, 1964	39.6					72	23	5.0	1.4		234	79	10				336	274	82	519	6.6			
July 28, 1964	.83										240	60	10	0.3	2.2	0.34	A322	262	65	503	7.8			
4-965.7. HOG CREEK AT GIRARD, MICH.																								
Apr. 15, 1964	44.3					75	22	5.7	1.4		234	83	10				340	278	86	534	6.9			
July 28, 1964	.08			0.60	0.84						232	6	10	0.2	2.1	0.30	A321	270	70	501	8.3			
4-967.2. SWAN CREEK NEAR BATAVIA, MICH.																								
Apr. 16, 1964	2.35					80	21	5.3	0.9		235	90	11				353	286	94	550	6.9			
July 28, 1964	1.01			0.42	0.04						226	62	10	0.1	0.9	0.06	A317	260	74	495	7.8			
A Calculated from determined constituents.																								

A Calculated from determined constituents.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Aluminum (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphorus (PO <sub>4</sub> )	Hardness as CaCO <sub>3</sub>		To-Specific Conductance (micro-mhos at 25°C)	Loss on ignition
																Calcium, magnesium	Non-carbonate		

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-967.4. SWAN CREEK TRIBUTARY NEAR BRONSON, MICH.

APR. 16, 1964	11.3				80	23	5.7	1.4		250	90	10				362	284	89	569
July 13.....	7.42									192	63	8.0				A286	224	66	447
July 29.....	5.36																		7.7

4-967.6. SWAN CREEK NEAR BRONSON, MICH.

APR. 16, 1964	21.1				80	22	9.0	1.6		232	98	15				381	290	100	579
July 13.....	7.42				10	0.15	1.1	1.1		196	73	18	0.5	4.0		310	242	81	501
July 29.....	5.36				12	.14	.11	.11		166	56	28	.5	6.7		280	186	50	480

4-967.8. LITTLE SWAN CREEK NEAR MATTESON, MICH.

APR. 16, 1964	6.29				53	19	5.3	1.4		180	64	9.0				272	210	62	424
July 13.....	.61									224	59	6.0	0.2	0.2	0.06	A301	246	62	471
July 29.....																			7.9

4-975.28. PRAIRIE RIVER NEAR BRONSON, MICH.

APR. 16, 1964	17.6				105	28	5.0	1.1		288	136	8.0				467	377	141	689
July 13.....	5.30									286	102	6.0	0.2	5.0	0.05	A406	343	108	634
July 29.....																			7.1

A Calculated from determined constituents.

## MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO <sub>3</sub> )	Carb. sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Phosphate (NO <sub>3</sub> (PO <sub>4</sub> ))	Disolved solids (residue at 180° C)	Hardness as CaCO <sub>3</sub>	To-Specific acid-ity micro-H <sup>+</sup> at 25°C	Detergent bi- or (MBAS)	Tur- dity
STREAMS TRIBUTARY TO LAKE ERIE																			
CUYAHOGA RIVER AT BRECKSVILLE, OHIO																			
Oct. 21, 1963										250	0	162	230		3.3	804	326	121	
Oct. 30, 1963										180	0	162	208		3.2	819	292	134	1420
Nov. 1, 1963										180	0	162	208		3.1	819	292	134	1300
Nov. 14, 1963										260	0	184	272		2.2	906	314	101	1590
4-2490. OSWEGO RIVER AT LOCK 7, OSWEGO, N.Y.																			
July 10, 1964	3400	0.8	0.08	0.02	156	16	149	3.8		140		104	394	0.4	3.8	957	455	341	1590
Aug. 13, 1964	1910	1.8	.16	.01	183	16	177	4.5		140		101	488	.3	3.6	1120	523	408	1890
Sept. 16, 1964	1520	1.2	.10	.03	183	16	181	4.7		134		108	495	.3	3.1	1140	523	413	1930
4-2507.5. SANDY CREEK NEAR ADAMS, N.Y.																			
July 10, 1964	5.5	3.5	0.11	0.61	53	4.5	8.5	1.7		156		21	15	0.2	1.6	188	151	22	333
Aug. 12, 1964	3.7	3.8	.19	.04	52	4.3	7.4	1.6		160		22	9.0	.1	.9	183	147	16	320
Sept. 16, 1964	2.4	2.3	.09	.02	44	4.8	6.4	1.4		129		26	10	.2	.4	159	130	22	278
ST. LAWRENCE RIVER BASIN																			
4-2620. OSWEGATCHIE RIVER NEAR OSWEGATCHIE, N.Y.																			
July 9, 1964	623	5.1	0.62	0.21	7.8	1.0	4.4	0.8		19		11	2.0	0.3	2.0	48	24	8	75
Aug. 12, 1964	32	4.9	.12	.08	6.8	1.1	3.8	.7		20		11	.4	.2	.5	44	21	4	65
Sept. 16, 1964	23	4.4	.18	.15	7.8	1.1	4.2	.8		20		14	1.8	.3	1.3	47	24	8	76
4-2688. WEST BRANCH ST. NIGUS RIVER NEAR PARISHVILLE, N.Y.																			
July 9, 1964	95	7.7	0.50	0.01	4.8	1.7	1.4	0.4		18		6.0	0.5	0.2	5.7	37	19	3	42
Aug. 12, 1964	77	8.5	.19	.01	5.8	1.4	1.5	.4		22		6.4	.2	.2	1.1	40	20	2	53
Sept. 16, 1964	78	8.8	.34	.01	5.6	.9	1.5	.4		20		6.4	.2	.2	1.0	41	18	1	49



## MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN

Periodic determinations of suspended-sediment discharge and particle size, water year October 1963 to September 1964  
(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)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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
STREAMS TRIBUTARY TO LAKE SUPERIOR																	
4-255. BOIS BRULE AT BRULE, WIS.																	
July 3, 1964.....	0920			114	5	1.5											
Aug. 3.....	1300			114	3	.9											
4-270. BAD RIVER NEAR ODANAH, WIS.																	
May 3, 1964.....	0940			1,800	60	259											
June 12.....	1000			250	12	6.1											
July 26.....	1455			52	18	2.5											
Aug. 28.....	1300			147	13	5.2											
STREAMS TRIBUTARY TO LAKE MICHIGAN																	
4-576.5. BLACK RIVER NEAR HUMBOLDT, MICH.																	
Oct. 10, 1963.....	1200			0.1	6	T											
Nov. 5.....	1055			3	3	T											
Dec. 2.....	1235			1	4	T											
Dec. 30.....	1230			1	5	T											
Jan. 29, 1964.....	1525			1	18	T											
Feb. 28.....	1200			1	7	T											
Mar. 31.....	1305			1	2	0.3											
Apr. 15.....	1730			50	4	.3											
May 6.....	0925			26	4	.3											
Aug. 3.....	1445			15	7	.3											
4-578.55. LAKE LORY OUTLET NEAR HUMBOLDT, MICH.																	
Oct. 10, 1963.....	1210			0.1	4	T											
Dec. 2.....	1250			.4	5	T											
Dec. 30.....	1250			.4	6	T											
Feb. 28, 1964.....	1530			.5	4	T											
Mar. 31.....	1545			10.5	1	T											
Apr. 22.....	1545			10	10	0.3											
May 6.....	0900			2	2	T											





4-695. PESHTIGO RIVER AT PESHTIGO, WIS.									
Apr. 23, 1964.....	1330			2	8.5				
4-735. FOX RIVER AT BERLIN, WIS.									
May 25, 1964.....	1200			47	145				
July 30.....	1030	1,140		59	42				
4-800. LITTLE WOLF RIVER AT ROYALTON, WIS.									
July 19, 1963.....	1715	173		2	0.9				
May 26, 1964.....	0815	290		16	12				
June 23.....	1250	238		18	12				
4-810. WAUPACA RIVER NEAR WAUPACA, WIS.									
July 19, 1963.....	1800	194		12	6.3				
May 7, 1964.....	1400	191		29	15				
4-860. SHEBOYGAN RIVER AT SHEBOYGAN, WIS.									
July 20, 1963.....	0815	42		6	0.7				
Mar. 16, 1964.....	1100	842		170	386				
Apr. 7.....	1400	796		156	335				
4-870. MILWAUKEE RIVER AT MILWAUKEE, WIS.									
July 20, 1963.....	0945	62		6	1.0				
May 23, 1964.....	1440	110		10	3.0				
July 23.....	1130	90		5*	13				
4-872.4. ROOT RIVER AT RACINE, WIS.									
May 14, 1964.....	1130	53		6	0.8				
May 28.....	0855	16		25	1.1				
July 1.....	1605	7.7		86	1.8				
July 18.....	1925	338		96	88				
July 21.....	0845	945		124	316				
July 28.....	1700	118		56	13				
T Less than 0.05 ton.									

**T Less than 0.05 ton.**







## 4-2150. CATUGA CREEK NEAR LANCASTER, N. Y.

Aug. 7, 1963.....	1015		527	308	438					
Mar. 5, 1964.....	1205	37	3540	1100	10500					

## 4-2152.5. WEST BRANCH CAZENOVIA CREEK NEAR EAST AURORA, N. Y.

Mar. 25, 1963.....	0940	36	938	186	471					
Apr. 19.....	2230	56	775	1360	2840					
Mar. 5, 1964.....	1500	34	1160	1820	5700					
Mar. 26.....	1220	39	--	135	--					

## 4-2153.5. EAST BRANCH CAZENOVIA CREEK AT SOUTH WALES, N. Y.

Mar. 20, 1963.....	1050	--	--	158	--					
Mar. 25.....	1300	36	663	252	451					
Apr. 20.....	0900	50	346	150	140					
Mar. 4, 1964.....	2250	33	1150	1140	3540					
Mar. 5.....	1500	36	1410	1090	4150					
Mar. 26.....	0045	37	254	57	39					
Mar. 26.....	1250	39	307	56	46					

## 4-2155. CAZENOVIA CREEK AT EBENEZER, N. Y.

Apr. 4, 1963.....	1005	46	2260	916	5300					
Aug. 5.....	1040	35	1740	1820	8400					
Mar. 5, 1964.....	1140	35	6100	1970	32900					
Mar. 26.....	1415	39	1500	159	644					

## STREAMS TRIBUTARY TO NIAGARA RIVER

## 4-2162. SCAJAKADA CREEK AT BUFFALO, N. Y.

Mar. 21, 1963.....	1350		60	74	12					
Apr. 4.....	0845		122	520	171					
Apr. 19.....	1940	57	558	3270	4930					
Apr. 19.....	2115		718	3300	6400					

E Estimated.



## MISCELLANEOUS ANALYSES OF STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size March 1963 to September 1964--Continued

(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)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment con- cen- tration (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	
STREAMS TRIBUTARY TO NIAGARA RIVER--Continued																	
4-2164. TONAWANDA CREEK NEAR JOHNSONBURG, N. Y.																	
Mar. 26, 1963.....	0850	34		450	304	369											
Apr. 20.....	0730	50		240	187	121											
Mar. 21.....	1000	34		1020	1640	4520											
Mar. 25.....	0740	37		176	131	60											
Mar. 26.....	0755	37		154	94	39											
4-2165. LITTLE TONAWANDA CREEK AT LINDEN, N. Y.																	
Mar. 26, 1963.....	0740	36		379	58	59											
Mar. 27.....	1330	40		256	47	32											
Apr. 2.....	1000	--		107	16	4.6											
Apr. 4.....	0605	47		469	117	148											
Apr. 4.....	1520	--		165	35	16											
Apr. 19.....	2305	--		111	109	33											
Apr. 20.....	0645	51		126	42	14											
4-2170. TONAWANDA CREEK AT BATAVIA, N. Y.																	
Mar. 18, 1963.....	1905	--		4420	382	4560											
Mar. 19.....	1350	34		2560	314	2170											
Mar. 20.....	0710	--		1680	195	884											
Mar. 21.....	1035	33		890	189	454											
Mar. 22.....	0820	37		1210	585	1910											
Mar. 25.....	2345	--		1830	230	1140											
Mar. 26.....	0645	--		2580	474	3300											BSWC
Mar. 27.....	1245	--		3420	442	4080											
Mar. 27.....	2315	--		2500	242	1630											
Mar. 28.....	1045	--		1630	192	845											
Apr. 4.....	0645	--		1840	236	535											
Apr. 4.....	1930	--		1820	575	2820											
Apr. 20.....	1550	51		824	1260	2800											
Mar. 4, 1964.....	1115	32		380	111	114											
Mar. 5.....	1315	35		3430	1490	13800											
Mar. 6.....	1420	34		3160	310	2640											
Mar. 25.....	1935	42		760	388	817											
Mar. 26.....	0700	38		1420	465	1760											
Mar. 26.....	1635	40		1560	276	1160											
Mar. 27.....	0745	32		1010	132	414											
BSWC																	

BSWC

98

96

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BSWC

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96

99

100









4-2305. OATKA CREEK AT GARBUCCI, N. Y.

Mar. 4, 1964.....	2320	39	258	20	14				
Mar. 5.....	0750	37	556	59	89				
Mar. 6.....	0845	32	2030	230	1260				
Mar. 7.....	1120	--	1440	62	244				
Mar. 8.....	1540	--	565	18	32				

4-2308.8. OATKA CREEK AT WARSAW, N. Y.

[illegible]

# INDEX

A	Page		Page
Acidity.....	19	Chloride.....	13
Alexandria Bay, N.Y., St. Lawrence River at.....	418	Chromium.....	15
Allegheny River, at Kittanning, Pa....	41-43	Clarion River at Cooksburg, Pa.....	40
at Oakmont, Pa.....	49-51	Clay, T. Va., Elk River at.....	107
at Warren, Pa.....	36-38	Cleveland, Ohio, Cuyahoga River at....	405-406
Alum Creek at Columbus, Ohio.....	127-130	Clinch River above Tazewell, Tenn....	271
Aluminum.....	11	Clinton River near Drayton Plains, Mich.....	347
Arthur, Tenn., Powell River near.....	273	Collection and examination of samples	3
Ashville, N.C., French Broad River at	252	Color.....	21
Athens, Ohio, Hocking River at.....	94-99	Columbus, Ohio, Alum Creek at.....	127-130
Au Sable River at Grayling, Mich.....	339	Composition of surface waters.....	10
at Mio, Mich.....	340	Conemaugh River at Seward, Pa.....	43-45
Aurora, Minn., Partridge River near....	315	Cooksburg, Pa., Clarion River at.....	40
St. Louis River near.....	316	Cooperation.....	28
		Copper.....	16
B		Cumberland River, at Barbourville, Ky.....	241
Baldwinsville, N.Y., Seneca River at.	414	at Smithland, Ky.....	248
Barbourville, Ky., Cumberland River at.....	241	near Burkesville, Ky.....	247
Barium.....	17	Cumberland River basin.....	241-248
Barren River at Bowling Green, Ky....	208	Cuyahoga River at Cleveland, Ohio....	405-406
near Finney, Ky.....	207	at Independence, Ohio.....	400-404
Bear Creek at Bishop, Ala.....	286-287	Cynthia, Ky., South Fork Licking River at.....	153
Bear Creek near Oak Ridge, Tenn.....	276		
Beaver Falls, Pa., Beaver River at...	68-70	D	
Beaver River at Beaver Falls, Pa.....	68-70	Dillon Falls, Ohio, Licking River near .....	90
Beaver River, at Moshier Falls, N.Y..	416	Dillsboro, N.C., Tuckasegee River at.	287
Beaver River basin.....	62-70	Dissolved oxygen.....	22
Bent Creek, N.C., French Broad River at.....	251	Dissolved solids.....	15
Bessemer, Mich., Black River near....	318	Division of work.....	28
Beverly, Ohio, Muskingum River near..	91-93	Dix River at Dix Dam, near Burgin, Tenn.....	178-179
Bicarbonate, Carbonate and hydroxide.	13	Doe River at Elizabethton, N.C.....	264
Big Raccoon Creek near Fincastle, Ind.....	214-224	Donnattsburg, N.Y., Independence River at.....	415
Big Sandy River basin.....	116-121	Drayton Plains, Mich., Clinton River near.....	347
Biochemical oxygen demand.....	22	Dresden, Ohio, Muskingum River at....	85-87
Bishop, Ala., Bear Creek at.....	286-287	Duck River above Hurricane Mills, Tenn.....	290
Black River at Elyria, Ohio.....	397-399	near Shelbyville, Tenn.....	288
Black River at Watertown, N.Y.....	417	Dundee, Ky., Rough River at.....	211
Black River near Bessemer, Mich.....	318		
near Garnet, Mich.....	319	E	
near Republic, Mich.....	320-321	Eagle Creek at Glencoe, Ky.....	185-189
Blantyre, N.C., French Broad River at	250	East Branch Au Gres River at McIvor, Mich.....	341
Bluestone Dam, W. Va., New River at..	101	East Branch Escanaba River at Gwinn, Mich.....	324-325
Boardman River near Mayfield, Mich....	336	East Fork Poplar Creek near Oak Ridge Tenn.....	275
Boron.....	15	East Fork White River at Seymour, Ind.....	233-234
Boston, Ky., Rolling Fork near.....	190	East Liverpool, Ohio, Ohio River at..	71-73
Bowling Green, Ky., Barren River at..	208	Eaton Rapids, Mich., Grand River near	330
Bromide.....	18	Elizabethton, N.C., Doe River at....	264
Bryson, N.C., Tuckasegee River at.....	268	Elizabethtown, Ohio, Great Miami River at.....	170-171
Buffalo River near Flat Woods, Tenn..	291	Elk River above Fayetteville, Tenn....	281
near Lobelville, Tenn.....	292	at Estill Springs, Tenn.....	280
Burgin, Ky., Dix River near.....	178-179	near Prospect, Tenn.....	282
Burkesville, Ky., Cumberland River near.....	247	Elk River, at Clay, W. Va.....	107
Byron, Mich., Shiawassee River at....	346	at Queen Shoals, W. Va.....	108
		at Sutton, W. Va.....	105
C		near Frametown, W. Va.....	106
Cabin Creek, W.Va., Kanawha River at.	104	Elkhorn City, Ky., Russell Fork at....	116
Calcium.....	11	Elkins, W. Va., Tygart River at.....	52
Cambridge, Ohio, Salt Fork near.....	84	Elyria, Ohio, Black River at.....	397-399
Campbellsville, Ky., Green River near	191	Estill Springs, Tenn., Elk River at..	280
Canaseraga Creek near Canaseraga, N.Y.....	412	Ewart, Mich., Muskegon River at.....	333
Cane Branch near Parkers Lake, Ky....	242-246	Expression of results.....	7
Canton, N.C., Pigeon River at.....	257		
Catalochee Creek near Cataloochee, N.C.....	259-260	F	
Cedar Creek near Pleasant Site, Ala....	283-284	Falls of Rough, Ky., Rough River near	210
Celo, N.C., South Toe River near.....	262-263	Farmers, Ky., Licking River at.....	142-146
Champion, Mich., Peshekee River near..	327	Fayetteville, Tenn., Elk River above.	281
Charleroi, Pa., Monongahela River at..	55-57	Fence, Wis., Popple River near.....	328
Charleston, W.Va., Kanawha River at..	109		
Cheat River at Lake Lynn, Pa.....	54		
Chemical oxygen demand.....	22		
Chemical quality.....	4		
Chilhowee Dam, Tenn., Little Tennesseee River below.....	269		
Chillicothe, Ohio, Scioto River at....	131		

	Page		Page
Fincastle, Ind., Big Raccoon Creek near.....	214-224	Ishpeming, Mich., Middle Branch Escanaba River near.....	321-322
Finney, Ky., Barren River near.....	207		
Flat Woods, Tenn., Buffalo River near.....	291	J	
Fluoride.....	14	Johns Creek near Van Lear, Ky.....	117
Ford River near Hyde, Mich.....	326	Jonesville, Va., Powell River near.....	272
Fort Wayne, Ind., St. Marys River near.....	348-371	K	
Foster City, Mich., Sturgeon River near.....	329	Kanawha Falls, W. Va., Kanawha River at.....	103
Frametown, W. Va., Elk River near.....	106	Kanawha River, at Cabin Creek, W. Va. at.....	104
Frankfort, Ky., Kentucky River at.....	180-184	at Charleston, W. Va.....	109
Fremont, Ohio, Sandusky River near.....	392-395	at Kanawha Falls, W. Va.....	103
French Broad River, at Ashville, N.C.....	252	at Winfield Dam, at Winfield, W. Va.....	110-112
at Bent Creek, N.C.....	251	Kanawha River basin.....	100-112
at Blantyre, N.C.....	250	Kentucky River at lock 4, at Frankfort, Ky.....	180-184
at Hot Springs, N.C.....	256	Kentucky River basin.....	175-189
at Marshall, N.C.....	253-255	Kermit, W. Va., Tug Fork at.....	121
at Rosman, N.C.....	249	Killbuck Creek at Killbuck, Ohio.....	80-83
French Creek at Utica, Pa.....	39	Kiskiminetas River at Leechburg (Vandergrift), Pa.....	46-48
Friendship, N.Y., Van Campen Creek at.....	411	Kiskiminetas River basin.....	43-48
Friendsville, Md., Youghiogheny River at.....	58	Kittanning, Pa., Allegheny River at.....	41-43
		Knapp Creek at Marlinton, W. Va.....	102
G		Kyrook, Ky., Nolin River at.....	205-206
Garnet, Mich., Black River near.....	319	L	
Genesee River at Driving Park Avenue, Rochester, N.Y.....	413	Lafayette, Ind., Wabash River at.....	213
Glencoe, Ky., Eagle Creek at.....	185-189	Lake Lynn, Pa., Cheat River at.....	54
Glenlyn, Va., New River at.....	100	Lansing, Mich., Grand River at.....	331
Grand Chain, Ill., Ohio River near.....	294-296	Lead.....	16
Grand River, at Lansing, Mich.....	331	Leavittsburg, Ohio, Mahoning River at.....	62-63
at Painesville, Ohio.....	407-410	Leechburg, Pa., Kiskiminetas River at.....	46-48
at Portland, Mich.....	332	Levisa Fork at Paintsville, Ky.....	118-121
near Eaton Rapids, Mich.....	330	Licking River, at Farmers, Ky.....	142-146
Grayling, Mich., Au Sable River at.....	339	at McKinneysburg, Ky.....	147-152
Manistee River near.....	334	below Dillon Dam, near Dillon Falls, Ohio.....	90
Great Miami River, at Elizabethtown, Ohio.....	170-171	near Newark, Ohio.....	88-89
at Hamilton, Ohio.....	167	Licking River basin.....	142-153
at Miamisburg, Ohio.....	158	Literature cited.....	34
at Middletown, Ohio.....	163-164	Lithium.....	12
near Hamilton, Ohio.....	168-169	Little Barren River near Monroe, Ky.....	193
near Miamisburg, Ohio.....	159-162	Little Bear Creek near Halltown, Ala.....	285
near Middletown, Ohio.....	165-166	Little Manistee River near Mayfield, Mich.....	335
Great Miami River basin.....	154-169	Little River above Townsend, Tenn.....	266
Green River, at lock 4, at Woodbury, Ky.....	209	Little Tennessee River below Chilhowee Dam, Tenn.....	269
at Mammoth Cave, Ky.....	202-203	Lobelville, Tenn., Buffalo River near.....	292
at Mumfordsville, Ky.....	194-201	Lowellville, Ohio, Mahoning River at.....	64-67
near Campbellsville, Ky.....	191	Lucasville, Ohio, Scioto River at.....	136-138
near Greensburg, Ky.....	192	Lupton, Mich., Houghton Creek near.....	342
Green River basin.....	191-211	Rifle River near.....	343
Greensburg, Ky., Green River near.....	192		
Greenup, Ky., Tygarts Creek near.....	122-125	M	
Gwynn, Mich., East Branch Escanaba River at.....	324-325	McGaw, Ohio, Upper Twin Creek at.....	139-141
		McIvor, Mich., East Branch Au Gres River at.....	341
H		McKinneysburg, Ky., Licking River at.....	147-152
Halltown, Ala., Little Bear Creek near.....	285	Magnesium.....	12
Hamilton, Ohio, Great Miami River at.....	167	Mahoning River at Leavittsburg, Ohio.....	62-63
Great Miami River near.....	168-169	at Lowellville, Ohio.....	64-67
Hazardness.....	18	Mammoth Cave, Ky., Green River at.....	202-203
Hazard, Ky., North Fork Kentucky River at.....	175-177	Wet Prong Buffalo Creek near.....	204-205
Hepco, N.C., Pigeon River near.....	258	Manganese.....	11
Higby, Ohio, Scioto River at.....	132-135	Manistee River near Grayling, Mich.....	334
Hocking River at Athens, Ohio.....	94-99	Marlinton, W. Va., Knapp Creek at.....	102
Hocking River basin.....	94-99	Marshall, N.C., French Broad River at.....	253-255
Hot Springs, N.C., French Broad River at.....	256	Maumee River, at buoy 31, at Toledo, Ohio.....	390-391
Houghton Creek near Lupton, Mich.....	342	at Center C and O Railroad dock, at Toledo, Ohio.....	386-389
Huntington, Ind., Wabash River at.....	212	at Craig Bridge, at Toledo, Ohio.....	380-381
Huntington, W. Va., Ohio River near.....	113-115	at Toledo Overseas Terminal dock, at Toledo, Ohio.....	382-385
Huron River at Milan, Ohio.....	396	at Waterville, Ohio.....	372-379
Hurricane Mills, Tenn., Duck River above.....	290	Mayfield, Mich., Boardman River near.....	336
Hyde, Mich., Ford River near.....	326	Little Manistee River near.....	335
Hydrogen-ion concentration.....	20	Metropolis, Ill., Ohio River at.....	293
		Miamisburg, Ohio, Great Miami River at.....	158
I		Great Miami River near.....	159-162
Independence, Ohio, Cuyahoga River at.....	400-404	Middle Branch Escanaba River near.....	321-322
Independence River at Donnattsburg, N.Y.....	415	Ishpeming, Mich.....	321-322
Introduction.....	1	Middletown, Ohio, Great Miami River at.....	163-164
Iodide.....	18		
Iron.....	11		



Page	Page
Middletown, Ohio, Great Miami River near.....	165-166
Milan, Ohio, Huron River at.....	396
Mineral constituents in solution.....	10
Mio, Mich., Au Sable River at.....	340
Miscellaneous analyses of streams in Ohio River basin.....	297-314
St. Lawrence River basin.....	419-435
Monongahela River at Charleroi, Pa.....	55-57
Monongahela River basin.....	52-61
Monroe, Ky., Little Barren River near.....	193
Moshier Falls, N.Y., Beaver River at.....	416
Munfordville, Ky., Green River at.....	194-201
Muskegon River at Ewart, Mich.....	333
Muskingum River at Dresden, Ohio.....	85-87
near Beverly, Ohio.....	91-93
Muskingum River basin.....	74-93
N	
New River at Bluestone Dam, W.Va.....	101
at Glenlyn, Va.....	100
Newark, Ohio, Licking River near.....	88-89
Newcomerstown, Ohio, Tuscarawas River at.....	74-79
Nickel and cobalt.....	16
Nitrate.....	14
Noblesville, Ind., White River at.....	231
White River near.....	229-230
Nolin River at Kyrock, Ky.....	205-206
Nora, Ind., White River near.....	232
North Fork Kentucky River at Hazard, Ky.....	175-177
O	
Oak Ridge, Tenn., Bear Creek near.....	276
East Fork Poplar Creek near.....	275
Poplar Creek near.....	274
Oakmont, Pa., Allegheny River at.....	49-51
Ohio River, at East Liverpool, Ohio, at lock and dam 53, near Grand Chain, Ill.....	294-296
at Markland Dam, near Warsaw, Ky.....	172-174
at Metropolis, Ill.....	293
at South Heights, Pa.....	59-61
Ohio River near Huntington, W. Va.....	113-115
Ohio River basin.....	36-314
miscellaneous analyses of streams in.....	297-314
Olentangy River near Worthington, Ohio.....	125-126
Olney, Ky., Tradewater River at.....	235-240
Orebank, Tenn., Reedy Creek at.....	265
Oxygen consumed.....	21
P	
Painesville, Ohio, Grand River at.....	407-410
Paintsville, Ky., Levisa Fork at.....	118-121
Palmer, Mich., Schweitzer Creek near.....	323
Parkers Lake, Ky., Cane Branch near.....	242-246
Parsons, W.Va., Shavers Fork at.....	53
Partridge River near Aurora, Minn.....	315
Peshekee River near Champion, Mich.....	327
Phosphate.....	14
Pigeon River, at Canton, N.C.....	257
at Waterville, N.C.....	261
near Hepco, N.C.....	258
near Vanderbilt, Mich.....	338
Piney River at Vernon, Tenn.....	289
Pleasant Hill, Ohio, Stillwater River at.....	154-157
Pleasant Site, Ala., Cedar Creek near.....	283-284
Poplar Creek near Oak Ridge, Tenn.....	274
Popple River near Fence, Wis.....	328
Portland, Mich., Grand River at.....	332
Powell River near Arthur, Tenn.....	273
near Jonesville, Va.....	272
Preface.....	111
Prior Creek near Selkirk, Mich.....	344
Properties and characteristics of water.....	18
Prospect, Tenn., Elk River near.....	282
Publications.....	26
Q	
Queen Shoals, W. Va., Elk River at.....	108
R	
Reedy Creek at Orebank, Tenn.....	265
Republic, Mich., Black River near.....	320-321
Rifle River at Selkirk, Mich.....	345
near Lupton, Mich.....	343
Riverton, Ind., Wabash River at.....	228
Rochester, N.Y., Genesee River at.....	413
Rolling Fork near Boston, Ky.....	190
Rosman, N.C., French Broad River at.....	249
Rough River at Dundee, Ky.....	211
at Rough River Dam, near Falls of Rough, Ky.....	210
Russell Fork at Elkhorn City, Ky.....	116
S	
St. Lawrence River at Alexandria Bay, N.Y.....	418
St. Lawrence River basin.....	315-435
miscellaneous analyses of streams in.....	419-435
St. Louis River at Scanlon, Minn.....	317
near Aurora, Minn.....	316
St. Marys River near Fort Wayne, Ind.....	348-371
Salt Fork at Mouth, near Cambridge, Ohio.....	84
Sandusky River near Fremont, Ohio.....	392-395
Scanlon, Minn., St. Louis River at.....	317
Schweitzer Creek near Palmer, Mich.....	323
Scioto River, at Chillicothe, Ohio.....	131
at Higby, Ohio.....	132-135
at Lucasville, Ohio.....	136-138
Scioto River basin.....	125-138
Sediment.....	5, 24
Selkirk, Mich., Prior Creek near.....	345
Rifle River at.....	414
Seneca River at Baldwinsville, N.Y.....	279
Sequatchie River near Whitwell, Tenn.....	43-45
Seward, Pa., Conemaugh River at.....	233-234
Seymour, Ind., East Fork White River at.....	53
Shavers Fork at Parsons, W. Va.....	289
Shelbyville, Tenn., Duck River near.....	346
Shiawassee River at Byron, Mich.....	10
Silica.....	248
Smithland, Ky., Cumberland River at.....	19
Sodium adsorption ratio.....	12
Sodium and potassium.....	153
South Fork Licking River at.....	59-61
Cynthiana, Ky.....	262-263
South Heights, Pa., Ohio River at.....	20
South Toe River near Celo, N.C.....	154-157
Specific conductance.....	25
Stillwater River at Pleasant Hill, Ohio.....	348-410
Streamflow.....	319-346
Streams tributary to Lake Erie.....	411-417
to Lake Michigan.....	315-318
to Lake Ontario.....	12
to Lake Superior.....	239
Strontium.....	337
Sturgeon River near Foster City, Mich.....	13
near Wolverine, Mich.....	225-227
Sulfate.....	105
Sullivan, Ind., Wabash River near.....	
Sutton, W. Va., Elk River at.....	
T	
Tazewell, Tenn., Clinch River above.....	271
Tellico Plains, Tenn., Tellico River at.....	270
Tellico River at Tellico Plains, Tenn.....	270
Temperature.....	5, 23
Tennessee River basin.....	249-292
Toledo, Ohio, Maumee River at.....	380-391
Tomotla, N.C., Valley River at.....	277-278
Tradewater River at Olney, Ky.....	235-240
Tradewater River basin.....	235-240
Tuckasegee River at Bryson, N.C.....	268
at Billsboro, N.C.....	267
Tug Fork at Kermit, W.Va.....	121
Turbidity.....	24
Tuscarawas River at Newcomerstown, Ky.....	74-79
Tygart River at Elkins, W.Va.....	52
Tygart's Creek near Greenup, Ky.....	122-125
Tygart's Creek basin.....	122-125
U	
Upper Twin Creek at McGaw, Ohio.....	139-141
Upper Twin Creek basin.....	139-141

	Page		Page
Utica, Pa., French Creek at.....	39	Waterville, Ohio, Maumee River at....	372-379
V		Wet Prong Buffalo Creek near Mammoth	
Valley River at Tomotla, N.C.....	277-278	Cave, Ky.....	204-205
Van Campen Creek at Friendship, N.Y..	411	White River, at Noblesville, Ind.....	231
Van Lear, Ky., Johns Creek near.....	117	near Noblesville, Ind.....	229-230
Vanderbilt, Mich., Pigeon River near..	338	near Nora, Ind.....	232
Vernon, Tenn., Piney River at.....	289	Whitwell, Tenn., Sequatchie River-	
W		near.....	279
Wabash River, at Lafayette, Ind.....	213	Winfield, W.Va., Kanawha River at....	110-112
at Huntington, Ind.....	212	Wolverine, Mich., Sturgeon River	
at Riverton, Ind.....	228	near.....	337
near Sullivan, Ind.....	225-227	Woodbury, Ky., Green River at.....	209
Wabash River basin.....	212-234	Worthington, Ohio, Olentangy River	
Warren, Pa., Allegheny River at.....	36-38	near.....	125-126
Warsaw, Ky., Ohio River near.....	172-174	Y	
Water-Quality stations, in downstream		Youghiogheny River at Friendsville,	
order.....	VII	Md.....	58
Watertown, N.Y., Black River at.....	417	Z	
Waterville, N.C., Pigeon River at....	261	Zinc.....	17