# Quality of Surface Waters of the United States 1963

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

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

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## UNITED STATES DEPARTMENT OF THE INTERIOR STEWART L. UDALL, Secretary

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#### **PREFACE**

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

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III

#### CONTENTS

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

	Page
Introduction	1
Collection and examination of samples	3
Chemical quality	4
Temperature	4
Sediment	5
Expression of results	6
Composition of surface waters	9
Mineral constituents in solution	10
Silica	10
Aluminum	10
Iron	10
Manganese	10
Calcium	11
Magnesium	11
Strontium	11
Sodium and potassium	12
Lithium	12
Bicarbonate, carbonate and hydroxide	12
Sulfate	13
Chloride	13
Fluoride	13
Nitrate	13
Phosphate	14
Boron	14
Dissolved solids	14
Chromium	15
Nickel and cobalt	15
Copper	15
Lead	16
Zinc	16
Barium	17
Bromide	17
Iodide	17
Properties and characteristics of water	17
Hardness	17
Acidity	18
Sodium-adsorption-ratio	19
Specific conductance	19
Hydrogen-ion concentration	20
Color	20
Oxygen consumed	21
Oxygen consumed	<b>41</b>

Composition of surface watersContinued	
Properties and characteristics of	
waterContinued	Page
Organics	21
Temperature	21
Turbidity	23
Sediment	23
Streamflow	24
Publications	26
Cooperation	27
Division of work	31
Literature cited	31
Chemical analyses, water temperatures, and	
sediment	34
Part 3. Ohio River basin	34
Allegheny River at Warren, Pa. (main	
stem) ct	34
Allegheny River at Kittaning, Pa. (main	
stem) ct	36
Kiskiminetas River basin	38
Kiskiminetas River at Leechburg	30
(Vandergrift), Pa. ct	38
Allegheny River at Oakmont, Pa. (main	30
	40
stem) ct	42
	42
Tygart River at Elkins, W.Va. t	44
Monongahela River at lock and dam 8, at	43
Point Marion, Pa. ct	43 47
Shavers Fork at Parsons, W.Va. ct	
Cheat River at Lake Lynn, Pa. t	49
Monongahela River at Charleroi, Pa. ct	50
Youghiogheny River at Friendsville, Md. t.	52
Youghiogheny River at Connellsville, Pa. c	53
Ohio River at South Heights, Pa. (main	- 4
stem) ct	54
Beaver River basin	56
Mahoning River at Leavittsburg, Ohio t	56
Mahoning River at Lowellville, Ohio ct	57
Beaver River at Beaver Falls, Pa. ct	60
Ohio River at East Liverpool, Ohio (main	
stem) ct	62
Ohio River at New Cumberland Dam, at	
Stratton, Ohio (main stem) ct	64
Muskingum River basin	68
Tuscarawas River at Newcomerstown, Ohio ct	68
Killbuck Creek at Killbuck, Ohio ts	75
Salt Fork at mouth, near Cambridge, Ohio c	79
Muskingum River at Dresden, Ohio s	80
Licking River near Newark, Ohio t	84
Licking River below Dillon Dam, near	
Dillon Falls, Ohio t	86
Muskingum River at McConnelsville, Ohio ct	87
Little Kanawha River basin	96
Little Kanawha River at Glenville,	
w.va. t	96

#### CONTENTS

Chemical analyses, etcContinued	
Ohio River basinContinued	Page
Hocking River basin	97
Hocking River at Athens, Ohio cts	97
Ohio River at lock and dam 22, at	
Ravenswood, W.Va. (main stem) ct	105
Kanawha River basin	108
New River at Glenlyn, Va. t	108
New River at Bluestone Dam, W.Va. t	109
Knapp Creek at Marlinton, W.Va. t	110
Kanawha River at Kanawha Falls, W.Va. t	111
Kanawha River at Cabin Creek, W.Va. t	112
Elk River at Sutton W.Va. t	113
Elk River at Sutton, W.Va. t	114
Elk River at Clay, W.Va. t	115
Elk River at Queen Shoals, W.Va. t	116
Kanawha River at Charleston, W.Va. t	117
Kanawha River at Winfield Dam, at	
Winfield, W.Va. ct	118
Ohio River near Huntington, W.Va. (main	110
	122
stem) c	123
	123
Russell Fork at Elkton City, Ky. t	124
Johns Creek near Van Lear, Ky. t Levisa Fork at Paintsville, Ky. ts	125
Tug Fork at Kermit, W.Va. t	129
Die Condu Divon at Catlettahum Vv. at	130
Big Sandy River at Catlettsburg, Ky. ct	133
Tygarts Creek basin	133
Tygarts Creek near Greenup, Ky. ts	137
Scioto River basin	137
Olentangy River near Worthington, Ohio t	138
Alum Creek at Columbus, Ohio s	142
Scioto River at Chillicothe, Ohio t	143
Scioto River at Higby, Ohio ts	143
Scioto River at Lucasville, Ohio ct	150
Licking River et Formers Vy to	150
Licking River at Farmers, Ky. ts	155
Licking River at McKinneysburg, Ky. cts South Fork Licking River at Cynthiana.	100
· · · · · · · · · · · · · · · · · · ·	163
Ky. tGreat Miami River basin (formerly published	103
as Miami River basin)	164
Great Miami River near Taylorsville Dam,	104
	164
at Taylorsville, Ohio c	166
Mad Pisser man Poston Obio of	169
Mad River near Dayton, Ohio cs	
Great Miami River at Miamisburg, Ohio t	172 173
Great Miami River near Miamisburg, Ohio cs	173
Great Miami River at Middletown, Ohio c	177
Great Miami River near Middletown, Ohio c.	178
Great Miami River at Hamilton, Ohio t	179
Great Miami River near Hamilton, Ohio c	119
Great Miami River at Elizabethtown, Ohio ct	180
	100

Chemical analyses, etcContinued	
Ohio River basinContinued	Page
Ohio River at Markland Dam, near Warsaw, I'y.	
(main stem) ct	183
Kentucky River basin	186
North Fork Kentucky River at Hazard, Ky.ct	186
Kentucky River at lock 4, at Frankfort,	
	190
Ky. cts Eagle Creek at Glencoe, Ky. ts	197
Eagle Creek at Glencoe, My. 15	202
Salt River basin	
Rolling Fork near Boston, Ky. t	202
Green River basin	203
Green River at Greensburg, Ky. c	203
Little Barren River near Monroe, Ky. c	204
Green River at Munfordville, Ky. cts	205
Green River at Mammoth Cave, Ky. c	212
Nolin River at Kyrock, Ky. t	214
Barren River near Finney, Ky. t	215
Barren River at Bowling Green, Ky. t	216
Green River at lock 4, at Woodbury, Ky. t.	218
Rough River at Rough River Dam, near	
Falls of Rough, Ky. t	219
Rough River at Dundee, Ky. t	221
Pond River near Sacramento, Ky. c	222
Wabash River basin	223
Wabash River at Lafayette, Ind. t	223 223
	224
Wabash River near Sullivan, Ind. ct	226
Wabash River at Riverton, Ind. t	
White River near Nobelsville, Ind. t	227
White River at Noblesville, Ind. t	228
White River near Nora, Ind. t	229
East Fork White River at Seymour, Ind. t	230
Wabash River near New Haven, Ill. ct	231
Tradewater River basin	234
Tradewater River at Olney, Ky. cts	234
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	243
Cumberland River at Smithland, Ky. t	244
Tennessee River basin	245
French Broad River at Rosman, N.C. c	245
French Broad River at Blantyre, N.C. c	246
French Broad River at Bent Creek, N.C. c	247
French Broad River at Asheville, N.C. c	248
French Broad River at Marshall, N.C. ct	249
	251
French Broad River at Hot Springs, N.C. c. Pigeon River at Canton, N.C. c	25 <sub>2</sub>
Pigeon River near Hepco, N.C. c	253
	203
Cataloochee Creek near Cataloochee,	054
N.C. ct	254
Pigeon River at Waterville, N.C. c	256
South Toe River near Celo, N.C. ct Doe River at Elizabethton, Tenn. t	257
	259
Tuckasegee River at Dillsboro, N.C. c	260

#### CONTENTS

Chemical analyses, etcContinued	
Ohio River basinContinued	_
Tennessee River basinContinued	Page
Tuckasegee River at Bryson City, N.C. c	261
Little Tennessee River at McGhee, Tenn. t.	262
Clinch River above Tazewell, Tenn. t	263
Powell River near Arthur, Tenn. t	264
Poplar Creek near Oak Ridge, Tenn. t	<b>26</b> 5
East Fork Poplar Creek near Oak Ridge,	
Tenn. t	266
Bear Creek near Oak Ridge, Tenn. t	267
Valley River at Tomotla, N.C. ct	268
Sequatchie River near Whitwell, Tenn. t	270
Elk River at Estill Springs, Tenn. t	271
Elk River above Fayetteville, Tenn. t	272
Elk River near Prospect, Tenn. t	<b>27</b> 3
Duck River near Shelbyville, Tenn. t	274
Duck River above Hurricane Mills, Tenn. t.	275
Buffalo River near Lobelville, Tenn. t	276
Ohio River at Metropolis, Ill. (main stem) t	277
Ohio River at lock and dam 53, near Grand	
Chain, Ill. (main stem) ct	278
Miscellaneous analyses of streams in Ohio	
River basin	281
Part 4. St. Lawrence River basin	295
Streams tributary to Lake Superior	295
Second Creek near Aurora, Minn. ct	295
Partridge River near Aurora, Minn. ct	297
St. Louis River near Aurora, Minn. c	299
Embarrass River at Embarrass, Minn. c	300
St. Louis River at Scanlon, Minn. c	301
Black River near Bessemer, Mich. t	302
Streams tributary to Lake Michigan	303
Black River near Garnet, Mich. t	303
Black River near Republic, Mich. cts	304
Middle Branch Escanaba River near	
Ishpeming, Mich. ct	308
Schweitzer Creek near Palmer, Mich. cts	311
East Branch Escanaba River at	04.4
Gwinn, Mich. cts	314
Ford River near Hyde, Mich. t	318
Sturgeon River near Foster City, Mich. t	319
Muskegon River at Evart, Mich. t	320
Manistee River near Grayling, Mich. t	3 <b>21</b>
East Branch Pine River near Tustin,	000
Mich. t	322
Pine River near Le Roy, Mich. t	323
Pine River near Hoxeyville, Mich. t	324
Little Manistee River near Freesoil,	0.05
Mich. t	325
Boardman River near Mayfield, Mich. t	326
Streams tributary to Lake Huron	327
Sturgeon River near Wolverine, Mich. t	327
Pigeon River near Vanderbilt, Mich. t	328
Au Sable River at Grayling, Mich. t	329

Chemical analyses, etcContinued	
St. Lawrence River basinContinued	
Streams tributary to Lake HuronContinued	Page
Au Sable River at Mio, Mich. t	330
East Branch Au Gres River at McIvor,	
Mich. t	331
Houghton Creek near Lupton, Mich. t	332
Rifle River at "The Ranch", near Luptor,	
Mich. t	333
Prior Creek near Selkirk, Mich. t	334
Rifle River at Selkirk, Mich. t	335
Shiawassee River at Byron, Mich. t	336
Streams tributary to Lake St. Clair	337
Clinton River near Drayton Plains, Mich. t	337
Streams tributary to Lake Erie	338
Maumee River at Waterville, Ohio ts	338
Maumee River at Craig Bridge, at Toledc,	
Ohio c	342
Maumee River at Toledo Overseas Terminal	012
Dock, at Toledo, Ohio c	344
Maumee River at Center of C. and O.	344
	346
Railroad Dock, at Toledo, Ohio c Maumee River at buoy 31, at Toledo, Ohio c	348
Sanductor Distance at Buoy 31, at 101edo, On10 C	349
Sandusky River near Freemont, Ohio c	352
Huron River at Milan, Ohio t	352 353
Black River at Elyria, Ohio ct	
Cuyahoga River at Independence, Ohio ts	356
Grand River at Painesville, Ohio ct	360
Streams tributary to Lake Ontario Genesee River at Driving Park Avenue,	364
Rochester, N.Y. t	364
Seneca River at Baldwinsville, N.Y. t	365
Beaver River at Moshier Falls, N.Y. t	366
Black River at Watertown, N.Y. t	367
St. Lawrence River at Alexandria Bay, N.Y.	00.
(main stem) ct	368
Miscellaneous analyses of streams in	000
St. Lawrence River basin	369
Index	387
	٠٠.
ILLUSTRATION	
IIIIONIIAIION	
	Page
Figure 1. Map of the conterminous United States	
showing basins covered by the five water-	
supply papers on quality of surface waters	_
in 1963	2

### QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1963

PARTS 3 and 4

#### INTRODUCTION

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

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

In 1941, the Geological Survey began publishing annual records of chemical quality, suspended sediment, and water temperature. The records prior to 1948 were published each year in a single volume for the entire country, and in two volumes in 1948 and 1949. Beginning in 1950, the records were published in four volumes and beginning in 1959 in five volumes. The drainage basins covered in the five volumes are shown in Figure 1. The data given in this volume were collected during the water year October 1, 1962, to September 30, 1963. The records are arranged by drainage basins in downstream order according to the Geological Survey method of reporting streamflow. Stations on tributary streams are listed between stations on the main stem in the order in which those tributaries enter the main stem.

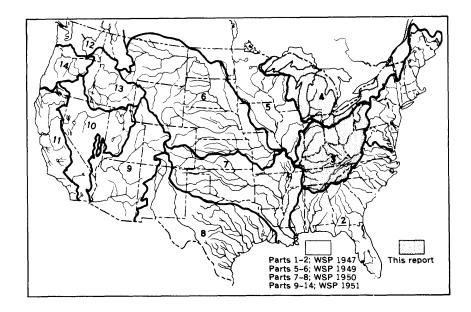


Figure 1.--Map of the conterminous United States showing basins covered by the five water-supply papers on quality of surface waters in 1963. The shaded portion represents the section of the country covered by this volume; the unshaded portion represents the section of the country covered by other water-supply papers.

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

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

During the water year ending September 30, 1963, the Geological Survey maintained 167 stations on 106 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 76 of these locations for chemical-quality studies. Samples were also collected less frequently at many other points. Water temperatures were measured daily at 133 stations. Not all analyses of samples of surface water collected during the year have been included. Single analyses of an incomplete nature generally have been omitted. Also, analyses made of the daily samples before compositing have not been reported. The specific conductance of almost all daily samples was determined, and as noted in the table headings this information is available for reference at the district offices listed under Division of Work, on page 31.

Quantities of suspended sediment are reported for 22 stations during the year ending September 30, 1963. 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. Particlesize distributions of sediments were determined at 14 of the stations.

#### COLLECTION AND EXAMINATION OF SAMPLES

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

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

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

#### CHEMICAL QUALITY

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

#### TEMPERATURE

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

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

#### SEDIMENT

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

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

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

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

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

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

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

#### EXPRESSION OF RESULTS

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

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

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

Conversion factors: Parts per million to equivalents per million

Ion	<b>M</b> ultiply by	Ion	Multiply by
Aluminum $(Al^{+3})$	.02669 .01456 .22192 .01639 .01251 .01779 .04990 .03333 .02821 .11539 .03394 .03148	Hydroxide $(OH^{-1})$ Iodide $(I^{-1})$ Iron $(Fe^{+3})$ Lead $(Pb^{+2})$ Lithium $(Li^{+1})$ Magnesium $(Mg^{+2})$ .  Mickel $(Ni^{+2})$ .  Nickel $(Ni^{+2})$ .  Nitrate $(NO_3^{-1})$ .  Phosphate $(PO_4^{-3})$ .  Potassium $(K^{+1})$ Sodium $(Na^{+1})$ Strontium $(Sr^{+2})$ Sulfate $(SO_4^{-2})$ Zinc $(Zn^{+2})$	0.05880 .00788 .05372 .00965 .14411 .08226 .03640 .03406 .01613 .03159 .02557 .04350 .02282 .02082

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

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

An average of analyses for the water year is given for most daily sampling stations. Most of these averages are arithmetical, time-weighted, or discharge-weighted; when analyses during a year are all on 10-day composites of daily samples with no missing days, the arithmetical and time-weighted averages are equiv-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 cortaining all of the water passing a given station during the year after thorough mixing in the reservoir. A discharge-weighted average is computed by multiplying the discharge for the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the dis-Discharge-weighted averages are usually lower than arithmetical averages for most streams because at times of high discharge the rivers generally have lower concentrations of dis-

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

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

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

#### COMPOSITION OF SURFACE WATERS

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

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

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

#### MINERAL CONSTITUENTS IN SOLUTION

#### Silica (SiO<sub>2</sub>)

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

#### Aluminum (Al)

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

#### Iron (Fe)

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

#### Manganese (Mn)

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

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

#### Calcium (Ca)

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

#### Magnesium (Mg)

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

#### Strontium (Sr)

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

Sodium and potassium (Na and K)

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

#### Lithium (Li)

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

Bicarbonate, carbonate and hydroxide (HCO3, CO3, OII)

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

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

#### Sulfate (SO<sub>4</sub>)

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

#### Chloride (Cl)

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

#### Fluoride (F)

Fluoride has been reported as being present in some rocks to about the same extent as chloride. However, the quantity of fluoride in natural surface waters is ordinarily very small compared to that of chloride. Investigations have proved that fluoride concentrations of about 0.6 to 1.7 ppm reduced the incidence of dental caries and that concentrations greater than 1.7 ppm also protect the teeth from cavities but cause an undesirable black stain (Durfor and Becker, 1964, 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 (NO<sub>3</sub>)

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

other organic matter. The quantities of nitrate present in surface waters are generally less than 5 parts per million (as NO<sub>3</sub>) and have no effect on the value of the water for ordinary uses.

It has been reported that as much as 2 parts per million of nitrate in boiler water tends to decrease intercrystalline cracking of boiler steel. Studies made in Illinois indicate that nitrates in excess of 70 parts per million (as NO<sub>3</sub>) may contribute to methemoglobinemai ("blue babies") Faucett and Miller, 1946, p. 593), and more recent investigations conducted in Ohio show that drinking water containing nitrates in the range of 44 to 88 ppm (as NO<sub>3</sub>) may cause methemoglobinemia (Waring, 1949). In a report published by the National Research Council, Maxcy (1950, p. 271) concludes that a nitrate content in excess of 44 parts per million (as NO<sub>3</sub>) should be regarded as unsafe for infant feeding. U.S. Public Health Service (1962) sets 45 ppm as the upper limit.

#### Phosphate (PO<sub>4</sub>)

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

#### Boron (B)

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

#### Dissolved solids

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

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

#### Chromium (Cr)

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

#### Nickel and cobalt (Ni, Co)

Nickel and cobalt are very similar in chemical behavior and also closely related to iron. Both are present in igneous rocks in small amounts and are more prevalent in silicic rocks. Any nickel in water is likely to be in small amounts and could be in a colloidal state. Cobalt may be taken into solution more readily than nickel. It may be taken into solution in small amounts through tacteriological 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. Fublic Health Service (1962) recommends that copper should not exceed 1.0 ppm in drinking and culinary water.

#### Lead (Pb)

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

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

#### Zinc (Zn)

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

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

#### Barium (Ba)

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

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

#### Bromide (Br)

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

#### Iodide (I)

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

#### PROPERTIES AND CHARACTERISTICS OF WATER

#### Hardness

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

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

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

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

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

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

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

#### Acidity (H<sup>+1</sup>)

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:

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

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 ir their proper perspective.

#### Color

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

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

#### Oxygen consumed

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

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

#### Organics

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

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

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

#### Temperature

Temperature is an important factor in property determining the quality of water. This is very evident for such a direct use as an industrial coolant. Temperature is also important, but perhaps not so evident, for its indirect influence upon aquatic biota, concentrations of dissolved gases, and distribution of chemical solutes in lakes and reservoirs as a consequence of thermal stratification and variation.

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

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

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

#### Turbidity

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

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

#### SEDIMENT

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

The quantity of sediment, transported or available for transportation, is affected by climatic conditions, form or nature of precipitation, character of the solid mantle, plant cover, topography, and land use. The mode and rate of sediment erosion, transport, and deposition is determined largely by the size distribution of the particles or more precisely by the fall velocities of the particles in water. Sediment particles in the sandsize (larger than 0.062 mm) range do not appear to be affected by floculation 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 Geological Survey State reports on the surface-water supply of the United States. The discharge reported for a composite sample is usually the average of daily mean discharges for the composite period. The discharges reported in the tables of single analyses are either daily mean discharges or discharges for the time at which samples were collected, computed from a stage-discharge relation or from a discharge measurement.

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

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

State	Drainage basin	Surface Water Franch district office		
Michigan	St. Lawrence River basin	407 Capitol Savings and Loan Bldg. Lansing, Mich. 48933		
Minnesota		1610 Post Office Bldg. St. Paul, Minn. 55101		
New York		P.O. Box 948 Federal Bldg. Albany, N.Y. 12201		
North Carolina	Ohio River basin	P.O. Box 2857 Federal Bldg. Raleigh, N.C. 27602		
Ohio		1509 Hess Street Columbus, Ohio 43212		
Pennsylvania		1224 Mulberry Street Harrisburg, Pa. 17104		
Tennessee		823 Edney Bldg. Chattanooga, Tenr. 37402		
West Virginia		3303 New Federal Office Bldg. 500 Quarrier St. East Charleston, W. Va. 25301		
Wisconsin	St. Lawrence River	5001 University Avenue Madison, Wis. 58705		

#### **PUBLICATIONS**

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

Numbers of water-supply papers containing records for	c
Parts 3 and 4, 1941-63	

Year	WSP	Year	WSP	Year	WSP	Year	WSP
1941 1942 1943 1944 1945 1946	942 950 970 1022 1030 1050	1947 1948 1949 1950 1951 1952	1102 1132 1162 1186 1197 1250	1953 1954 1955 1956 1957 1958	1290 1350 1400 1450 1520 1571	1959 a 1960 a 1961 1962 1963	1642 1742 1882 1942 1948

a To be published.

Geological Survey reports containing chemical quality, temperature, and sediment data obtained before 1941 are listed below. Publications dealing largely with the quality of ground-water supplies and only incidentally covering the chemical composition of surface waters are not included. Publications that are out of print are preceded by an asterisk.

#### PROFESSIONAL PAPER

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

#### BULLETINS

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

#### WATER-SUPPLY PAPERS

- \*108. Quality of water in the Susquehanna River drainage basin, with an introductory chapter on physiographic features, 1904.
- \*161. Quality of water in the upper Ohio River basin and at Erie, Pa., 1906.
- \*193. The quality of surface waters in Minnesota, 1907.
- \*236. The quality of surface waters in the United States, Part 1,
  Analyses of waters east of the one hundredth meridian,
  1909.

- \*237. The quality of the surface waters of California, 1910.
- \*239. The quality of the surface waters of Illinois, 1910.
- \*273. Quality of the water supplies of Kansas, with a preliminary report on stream pollution by mine waters in southeastern Kansas, 1911.
- \*274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, 1911.
- \*339. Quality of the surface waters of Washington, 1914.
- \*363. Quality of the surface waters of Oregon, 1914.
- \*418. Mineral springs of Alaska, with a chapter on the chemical character of some surface waters of Alaska, 1917.
- \*596-B. Quality of water of Colorado River in 1925-26, 1928.
- \*596-D. Quality of water of Pecos River in Texas, 1928.
- \*596-E. Quality of the surface waters of New Jersey, 1928.
- \*636-A. Quality of water of the Colorado River in 1926-28, 1930.
- \*636-B. Suspended matter in the Colorado River in 1925-28, 1930.
- \*638-D. Quality of water of the Colorado River in 1928-30, 1932.
- \*839. Quality of water of the Rio Grande basin above Fort Quitman, Tex., 1938.
- \*889-E. Chemical character of surface water of Georgia, 1944.
- \*998. Suspended sediment in the Colorado River, 1925-41, 1947.
- 1048. Discharge and sediment loads in the Boise River drainage basin, Idaho, 1939-40, 1948.
- 1110-C. Quality of water of Conchas Reservoir, New Mexico, 1939-49, 1952.

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

#### COOPERATION

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

Many State and Federal agencies assisted in collecting records for these quality-of-water investigations. Financial assistance was provided by the Soil Conservation Service and Forestry Service of the United States Department of Agriculture for some water-quality investigations. The Atomic Energy Commission provided financial assistance through arrangements with Oak

State	Cooperating agency	Drainage basin	District office	28
Georgia	Department of Mines, Mining and Geology, Captain Garland Payton, director.	Ohio River	Room 244 Federal Bldg. Ocala, Fla. 32670	Q
Illinois	Ohio River Valley Water Sanitation Commission, Dr. Edward J. Cleary, executive director and chief engineer.		2822 E. Main Street Columbus, Ohio 43209	UALITY
Indiana	Ohio River Valley Water Sanitation Commission, Dr. Edward J. Cleary, executive director and chief engineer.			OF SURF
Kentucky	University of Kentucky, Dr. John W. Oswald, president, through State Geological Survey, W. W. Hagan, director and State Geologist. Ohio River Valley Water Sanitation Commission, Dr. Edward J. Cleary, executive director and chief engineer.			ACE WATERS,
Michigan	Michigan State Water Resources Commission, Loring F. Oeming, executive secretary.			1963
Minnesota	Minnesota Department of Conservation, Division of Waters, S.A. Frellsen, director.	St. Lawrence River	Cotner Terrace 235 North Cotner Blvd. Lincoln, Nebr. 68505	

State	Cooperating agency	Drainage basin	District office
New York	New York Department of Commerce, Bureau of Industrial Development, Henry Gallien, director. New York State Conservation Department, Division of Water Resources, F. W. Montanari, assistant commissioner.	St. Lawrence River	P.O. Box 948 Room 348 Federal Bldg. Albany, N.Y. 12201
th Carolin	North Carolina North Carolina Department of Water Resources, H. E. Brown, director.	Ohio River	P.O. Box 2857 Federal Bldg. Raleigh, N.C. 27602
Ohio	Department of Natural Resources, Fred E. Morr, director. Department of Health, Dr. Emmett W. Arnold, director. Miami Conservation District Max L. Mitchell, chief engineer. Ohio River Valley Water Samitation Commission, Dr. Edward J. Cleary, executive director and chief engineer.	Ohio River St. Lawrence River	2822 E. Main Street Columbus, Ohio 43209
Pennsylvania	Pennsylvania Department of Agriculture, Dr. William L. Henning, secretary. Pennsylvania Department of Forests and Waters, Maurice K. Goddard, secretary.		Room 1302 IJ. S. Custom House 2nd and Chestnut Sts. Philadelphia, Pa.19106

30	WONI	JIII OI	DOILT ACL
District office	823 Edney Bldg. Chattanooga, Tenn. 37402	2822 E. Main Street Columbus, Ohio 43209	
Drainage basin	Ohio River		St. Lawrence River
Cooperating agency	Tennessee Department of Conservation and Commerce, J. B. McBride, commissioner through Division of Water Resources, R. W. Robinson, director.  Tennessee Valley Authority.	Ohio River Valley Water Sanitation Commission, Dr. Edward J. Cleary, executive director and chief engineer.	Wisconsin Conservation Department, L. P. Voigt, director, through Wisconsin State Committee on Water Pollution, T. F. Wisniewski, director
State	Tennessee	West Virginia	Wisconsin

Ridge National Laboratory for the operation of three thermograph stations in Tennessee. In addition to the cooperative programs, many stations were operated from funds appropriated directly to the Geological Survey.

#### DIVISION OF WORK

The quality-of-water program was conducted by the Water Resources Division of the Geological Survey, L.B. Leopold, chief hydrologist, and S. K. Love, chief, Quality of Water Branch. The records were collected and prepared for publication under supervision of district engineers, district chemists or district chief as follows: In Pennsylvania, N. H. Beamer; North Carolina, G. A. Billingsley; Minnesota, D. M. Culbertson; Tennessee, J. S. Cragwall, Jr.; Georgia, K. A. MacKichan; New York, F. H. Pauszek, and in Illinois, Indiana, Kentucky, Michigan, Ohio, West Virginia, and Wisconsin, G. W. Whetstone. Any additional information on file can be obtained by writing or visiting the responsible Survey district office.

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# CHEMICAL ANALYSES, WATER TEMPERATURES, AND SEDIMENT

#### PART 3. OHIO RIVER BASIN

#### OHIO RIVER MAIN STEM

3-126. ALLEGHENY RIVER AT WARREN, PA.

LOCATION.—4. Paridge on U.S. Highway 6, Warren County, approximately 9.5 miles downstream from gaging station near Kinzua.

BENIAMOR, "ARM.—2. 233 equate mileses: October 1948 to September 1951, October 1961 to September 1963.

RECORDS AVAILABLE. "Check 1948 to September 1954 to September 1953.

EXTREMES: 1956-651—2. Deposition on checking the Conduction of Mariana daily, 692 micromion Sept. 17 minimum daily, 77 micromions Mar. 28.

EXTREMES: 1956-651—2. Deposition on checking the Conduction of Mariana daily for Minimum, for several days in Deposition Annuary. The Sept. 17 micromion and Annuary. Stream 1861-651—2. Deposition on the Conduction of Mariana daily and Annuary of Papm Mar. 1—10, 1944.

EXTREMES: 1946-511 Mariana Mariana daily 1.110 micromion Oct. 13, 1944, minimum daily, 43 micromion San. 22, 1962.

Specific conductation of Mariana daily, 1.10 micromion Oct. 13, 1944, minimum daily, 43 micromion San. 22, 1962.

REARMES: Associated to Specific conductation of daily samples wallable in district office at Philadelphia, Pa. No discharge records available.

		<sub>3</sub> ⁵													
		Hd	7.5	7.0		7.4	7.4	7.2	6.9	6.7	7.3	7.0	7.2	7.3	7.3
	Specific	ance (micro- mhos at 25°C)	391	263		279	386	346	389	138	184	231	417	454	582
	Total	acid- ity as H <sup>+</sup> 11													
	Hardness as CaCO,	Non- arbon-	48				47		49	17	18	24	46	43	28
	Hard as C	Cal- cium, magne- sium	88	29			93		104						
63	Diegoland		235	156			215		231	!	107	119	246	247	342
ber 19		Ni- trate (NO <sub>3</sub> )	0.6	۲.		٦.	9.	1.7	2.0	1.5	æ	1.3	1.0	ij	۲.
Septem		Fluo- ride (F)	0.0	•		۲.	Ċ,	67	Τ.	1	۲.	۲.	۲.		1.
water year October 1962 to September 1963		Chloride (C1)	74	42		44	64	28	72	16	28	37	82	87	120
ear Octobe		Sulfate (SO <sub>4</sub> )	21	16		16	24	17	16	14	13	13	14	16	18
rater ye		Bicar- bonate (HCO <sub>3</sub> )		39			57		89						
11on, 1	100	tas- sium (K)	1.8	1.1		1.8	2.1	3.0	ī.	1	'n	1.2	1.0	2.0	2.8
Chemical analyses, in parts per million,		Sodium (Na)	38	22			34		35	9.7	15	19	41	46	29
in part	Moz	nag- ne- sium (Mg)	6.1	3.4		3.4	5.6	5.4	8.3	1	3.9	3.9	6.3	5.8	7.2
yses,		Cal- cium (Ca)	25	18		8	88	23	28	!	14	18	30	32	39
l anal	Mon	ga- nese (Mn)	0.03	.01				8		i	00	8	.02	8	00
Chemics		Iron (Fe)	0.01	.03		.01	.02	00.	. 02	7	00.	00.	.02	00.	00.
		Alum- inum (A1)													
		Silica (SiO <sub>2</sub> )	8.4	2.8		6.4	6.0	6.5	11	1	3.8	5.9	5.4	2.8	4.4
		Mean discharge (cfs)													
		Date of collection	Oct. 1-10,1962	Nov. 1-10	Dec. 1-2, 4-5,	7, 9-10	Jan. 1-10,1963	Feb. 1-10	Mar. 1-5	Apr. 8-10	May 1-10	June 1-10	July 1-10	Aug. 1-10	Sept. 1-10

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

Aver-	age	0,4 m	51 50 50 51 50 50	46 55 67	100
	31	415	613	131	70
	30	44 34 33	34	51 60 75	72 68 56
	29	43 34 33	32 34	50 75	5 9 7 5 8 9
	28	42 33 34	32 33 40	43 60 73	78 65 58
	27 28	44 34 34	813	4 20 7	78 65 56
	28	44 35 33	888	43 55 69	77
	25	c ç 9 € 7 †	32 33 33 33 38 39	49 40 7	76
	21 22 23 24	42 37 35	33 33	525	71 74 70 70 70
	23	51 38 55	2 6 6 5 6 6	50 52 64	12.51
	22	33	93 93 93 93 93 93	500	121
	21	55 36 33	999	51 56 65	6.5
	19 20	36 36 33	6 4 4	5.52	69
	19	56 37 33	33	553	63
	18	62 55 40 40 33 34	33 34 34 33	47 50 56 56 65 65	70 70 69 69 62
	17	62 40 33	333	47 56 65	70
Day	6 7 8 9 10 11 12 13 14 15 16 17 18	60 40 34	33 33 33 33	44 45 54 55 65 64	68 68 61 59
	15	39	999	4 5 0 4 4 0	68
	14	55 43 34	33 1	4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	71
	13	57 43 33	181	4 0 0 4 4 0	69
	12	60 45 42 32 33	33 33	5 5 5 5 5 5 5	67 68 67
	=	145	33	42 58 76	000
	10	57 44 44 34 34	33 33	45 72 72	70 66
	٥	5.7 4.4 3.4		54 58 68	70 71 72
	8	67 42 33	488	44 56 7	71
	7	57 41 34	9 9 9 4 4 4 6	4 2 3	70 71 72 72 73
	9	80 4 E	33.4	4 5 6 4 6 4 6 4 6 4 6 4 6 4 6 4 6 4 6 4	75 66 66
	5	58 44 36	388	4 4 0 4 4 0	70
	4	35	33 4	53 66	74 70 71 72 75 65
	က	34.3	344	4 4 9 8 6 6	
	7	8 4 8 3 4 4 3 3	33 34	42 42 42 45 61 62	76 78 70 72 70
	_	0,4 E E 4			
1,000	Month	October November	January February March	April May	July

OHIO RIVER MAIN STEM -- Continued

## 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.

PRINKICE AREA.—18,773 square miles.

RECORDS ANILABLE.—Chemical mailyses.

RECORDS ANILABLE.—Chemical mailyses.

RECORDS ANILABLE.—Chemical mailyses.

EXTREMES 1962-63.—2-Descrite conductance: Naximum daily, 441 microbnols Oct. 17, minimum daily, 103 micromhos Mar. 29, 31.

EXTREMES 1962-63.—2-Descrite conductance: Naximum daily, 441 microbnols Oct. 17, minimum daily, 103 minimum, 63 ppm Mar. 1-10, 1945.

EXTREMES 1964-63. 1966-69.—2-Dissolved Solids (1944-47, 1948-69); minimum, 378 ppm Oct. 11.-20, 1965; minimum, 63 ppm Mar. 1-10, 1945.

Specific conductance: Maximum daily, 860 micrombos Oct. 18, 1964; minimum daily, 76 micrombos Apr. 1-10, 1951.

Specific conductance: Maximum daily, 860 micrombos Oct. 18, 1964; minimum dispoint on many days during winter months.

REMARKS.—Records of specific conductance of daily samples available in district office at Philadelphia, Pa.

	ſ	<u>.</u> .	N	10	ß	'n	ო	ıc.	٠	ო	ო	C)	ო	2
	_	H Col.	5	3	т.	7.1	7.2	6.		г.	7.3	3	6	0
	0.1	pH pH	5 7											
	Specific	) <b>1</b>	41	23	22	27	26	294	12	17	203	28	34	39
	Total	ity as H <sup>+</sup> 1												
	ness aCO <sub>3</sub>	Non- carbon- ate	72	45	39	48	28	53	26	34	39	56	99	77
	Hardness as CaCO <sub>3</sub>	Cal- cium, magne- stum	119	192	73	68	89	86	41	28	29	93	104	121
1963	Dissolved	solids (residue at 180°C)	235	133	127	159	145	169	92	110	117	161	198	228
nber 1	į	trate NO <sub>3</sub> )	0.4	1.0	۲.	1.5	2.3	6.	4	9	4	7	80	1.0
to September	î	ride (F)	0.2	Τ.	0.	0.	7	l	1	۲.	۲.	. 2	.2	. 2
1962		Chloride (Cl)	52	22	21	56	23	23	7.0	14	18	56	36	42
water year October		Sulfate (SO <sub>4</sub> )	59	39	35	41	49	52	24	34	36	26	63	74
water		bonate honate (HCO <sub>3</sub> )	57	38	41	20	38	40	18	30	34	45	46	54
	Pot-	tas- sium (K)	2.1	1.0	1.0	1.0	8.2	1,3	. 7	.5	1.2	1.2	2.2	1.8
analyses, in parts per million,		Sodium (Na)		12					4.2	8.5	10	16	21	27
in part	Mag-	ne- sium (Mg)	10	8.9	4.9	6.3	7.5	6.3	3.2	4.4	5.4	8.9	7.5	8.8
lyses,	-	cium (Ca)	31	19	21	22	23	24	11	16	18	26	58	34
al ana	Man-	ga- nese (Mn)	0.01	00.	00.	00	00.	1	l	00.	00.	90.	00.	. 01
Chemical		Iron (Fe)	0.10	00.	00.	00.	90.	l	1	00.	00.	00.	00.	. 05
		inum (AI)												
		Silica (SiO <sub>2</sub> )	2.8	4.6	3.4	4.1	6.0	7.8	5.6	3.0	2.8	3.9	5.6	3.2
		Discharge (cfs)						9920						1420
	4	of collection	Oct. 1-10,1962	Nov. 1-5, 7-10	Dec. 1-10	Jan. 1-10,1963	Feb. 1, 3-10	Mar. 1-10	Apr. 1-10	May 1-10	June 1-10	July 1-10	Aug. 1-10	Sept. 1-10

OHIO RIVER MAIN STEM--Continued

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

Temperature °F of water, water year October 1962 to September 1963  Day	Tempera	Tempera	Tempera	Tempera	Tempera	mpera	eq.	2	re	F O	wa	ter	Wa	ter	yea	100	cto	ber	196	t t	Se	pten	iber	196	60					İ	ŀ	
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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	3 4 5 6 7 8	3 4 5 6 7 8						9 10 11 12	10 11 12	11	2	-	13	4	15	16	17	-8	19	20	7	22	23	24	25	26	27	28	56		31	age
October 61 61 61 61 64 64 64 64 64 65 62 November 49 40 48 47 46 - 45 46 45 45 46 45 46 45 December 40 40 38 39 39 39 38 38 38 37 34 - 34	61 61 61 61 60 61 61 61 61 61 61 49 48 47 46 45 46 45 45 46 40 38 39 39 38 38 37 34	61 61 61 60 61 61 61 61 64 48 47 46 45 46 45 45 45 39 30 38 38 38 37 34	61 61 63 61 61 61 61 61 62 45 46 45 46 39 39 38 38 38 37 34	61 61 61 61 62 45 46 45 45 46 38 37 34	61 61 61 61 62 45 46 45 45 46 38 37 34	61 61 61 61 62 45 46 45 45 46 38 37 34	61 61 62 45 45 46 37 34	61 45 46 34	46	3 4 6	9 4 6		62 61 46 46 34 34		45 34 34	34	62 45 34	62 45 34 34 34	94 44 34 35	61 35	95	61 61 44 44 35 35	3 4 5 5 4 5	5 m 4	0 4 W 4 W	464	464	5 4 1 5 4 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4	342	12.42	2 1 2	7. 4. 4. V V O
January 34 33 34 34 34 34 34 36 35 February 33 35 34 39 33 34 34 37 33 33 34 34 34 March 34 35 35 35 34 35 35 35 35 35 35 35 35 35	33 34 34 34 34 34 34 34 34 34 36 35 34 39 33 34 34 34 33 33 33 34 35 35 24 3 35 34 35 35 35 35	34 34 34 34 34 34 34 34 34 36 35 35 35 35 35 35 35 35 35 35 35 35 35	34 34 34 34 34 34 36 36 35 35 35 35 35 35	34 34 34 34 34 34 34 34 34 33 33 33 34 35 35 35 35 35	34 34 34 34 34 34 34 34 34 33 33 33 34 35 35 35 35 35	34 34 34 36 33 33 34 35 35 35 35	34 34 36 33 33 34 35 35 35	34 36 33 34 35 35	36	36 36	000	10 + 4	35	8 8 4 4 4	34 34	3 6 1	67 20 20 67 68 70	2 K 2) E E B	36	36 35 35	33 34 33 33 33	34 33	220	23 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2000	5 B B	34 33 45 45 45 45 45 45 45 45 45 45 45 45 45		614	411	4   9	3 4 4 5
April 45 46 46 48 49 44 50 48 49 48 62 6 May 51 51 56 52 55 55 55 56 59 60 62 6 June 63 63 64 65 66 67 68 69 69 69 70 7	46 46 48 49 49 50 48 49 49 62 62 59 60 62 62 63 64 65 66 67 68 69 69 69 70	46 48 49 44 55 48 49 48 48 48 50 52 55 55 56 59 60 62 62 64 65 66 67 68 69 69 69 70	49 49 50 48 49 48 48 55 55 55 56 59 6v 62 66 67 68 69 69 69 70	55 55 56 59 68 68 67 65 65 67 67 67 68 69 69 70	55 55 56 59 68 68 67 65 65 67 67 67 68 69 69 70	48 49 48 48 56 59 6v 62 6y 69 69 7U	59 67 62 59 60 62 59 69 70	48 60 69 70	407	407		4.6 6.2 70	462	4.9 7.0 7.0	48	20°5	8 <del>4</del> 8 6 0 6 9	4 H 6 J 6 9	7 4 7	3000	7 0 7	54 61 62 70 69	2000	52 61 69	75.7	711	4, 5, 61 61 72 73		50 52 03		1 4 1	4 C V
July	74 75 75 75 74 77 76 76 76 71 70 69 69 71 70	74 75 75 75 74 77 76 76 76 71 70 69 69 71 70	74 75 75 75 74 77 76 76 76 71 70 69 69 71 70	75 75 74 76 76 76 69 69 71 70	75 75 74 76 76 76 69 69 71 70	75 75 74 76 76 76 59 59 71 70	74 76 71 70	74 73 73 76 76 74 71 70 73 70	76 76 74 76 76 74 70 73 70	73 73 76 74 70 70	72,07		72 73 74 73 70 70	73 77	72 73 69	72 71 69	72 73 73 74 73 71 71 72 69 69 69 69		75 76 70 7J 70 71	75 76 70 71		75 74 70 71 70 69		75 75 71 72 68 68	76 71 70 66 66		70 77 78 77 70 70 71 70 65 66 67 65	77 77 77 66	78 77 71 70 67 65		70	75 73 69

### KISKIMINETAS RIVER BASIN

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

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

from gaging station at Vandergrift.

PRAINTER ARRA.—1.800 square miles.

RECORDS AVAILABLE.—Chemical inalyses: October 1946 to September 1951, October 1958 to July 1959, October 1969 to September 1963.

Rate inappratures: October 1946 to September 1951, October 1958 to July 1959, Movember 1969 to September 1963.

Rate inappratures: October 1946 to September 1953, October 1958 to July 1959, Movember 1969 to September 1963.

Rate inappratures: Maximum daily, 1, 2.

RATE in Conductance: Maximum daily, 1, 2.

RATE in Conductance: Maximum daily, 1, 2.

RATE in Conductance: Maximum daily, 5, 420 micrombos Aug. 12, 1964, minimum, 74 ppm Mar. 30 to Apr. 8, 1960.

Rate in Conductance: Maximum daily, 5, 420 micrombos Aug. 12, 1961; minimum daily, 175 micrombos July 22, 1960.

RATE in Conductance: Maximum daily, 5, 420 micrombos Aug. 12, 1961; minimum daily, 175 micrombos July 22, 1960.

RATE in Conductance: Maximum daily, 5, 420 micrombos Aug. 12, 1961; minimum daily, 175 micrombos July 22, 1960.

RATE in Conductance: Maximum daily, 5, 420 micrombos Aug. 12, 1961; minimum, if it instruct office at Philadelphia, Pa. Records of discharge are based on records for Kiskiminetas River at Vandergriff.

		Col- or	3	m		co.	01	m	ო	N	m	m	-
		Нď	3.7	4.0		3.7	3.8	3.6	3.5	3.2	3.2	3.4	3.2
	Specific conduct-	ance (micro- mhos at 25°C)	577	520		663	202	466	623		1070		•
	Total	acid- ity as H <sup>+</sup> 1	9.0	۲.		1.0	1.0	6.	1.3	1.8	1.8	1.6	2.4
	Hardness as CaCO <sub>3</sub>	Non- carbon- ate	161	158		178	125	127	161	210	254	266	391
	Hard as C	Cal- cium, ca magne- sium	161	158		178	125	127	161	210	254	266	391
963	Dissolved	solids (residue at 180°C)	323	312		1	260	265	341	459	582	199	988
mber 1	;	trate (NO <sub>3</sub> )	2.7	89.		1	5.3	6.	е.	۳.	3	3.6	2.2
Septe	i	ride (F)	0.2	e,						8	?	ო.	4.
Chemical analyses, in parts per million, water year October 1962 to September 1963		Chloride (Cl)	12	10		14	5.0	7.0	0.6	12	12	16	24
year Octob		Sulfate (SO <sub>4</sub> )	214	200					236		402		
Water		bonate (HCO <sub>3</sub> )	0	0		0	0	0	0	0	0	0	0
110n,	Pot-	tas- sium (K)	4.6	4.5		1	3.7	2.2	1.8	8.8	3.8	8.6	50
ts per m1]		Sodium (Na)	13	14		38	12	10	16	23	31	30	49
in par	Мад-	ne- sium (Mg)	91	14		1	11	12	16	19	23	24	38
dyses,	Cal- cium (Ca)		38	40		1	32	31	38	53	64	67	94
al ans	Man-	ga- nese (Mn)		4.0		1	2.2	2.0	1.6	2.2	23	0.9	4.6
Chemic		Iron (Fe)	0.10	.02		ł	.10	60.	.18	.33	1.2	.47	4.2
		inum (A1)	3.7	3.5		1	3.5	3.8	4.8	7.2	8.8	7.6	11
		Silica (SiO <sub>2</sub> )	12	12	_	1	9.7	11	12	#	16	13	14
		Discharge (cfs)	3170	2140		1260	10880	3650	1720		528		
	4	Date of collection	Oct. 1-10,1962	Nov. 2-10	Jan. 1, 9-10,	1963	Mar. 1-6, 8-10	Apr. 1-10	May 1-8, 10	June 1-10	July 1-3, 6-10	Aug. 1-10	Sept. 1, 3-10.

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

						<b>E</b>	remperature	a na	4	5	# # F	3	20	À	Day	water, water year occoper 1502 to september.	Jan	130	3	90	T C	i i	COCT							Aver
Month	-	2	က	4	2	9	7	8	6	10	1 12	13	14	15	15 16	17	17 18	19	20	21	22	23	24	25 2	26 2	27 28	$\sim$	29 30	0 3	age
October November December	56 49 43	66 99	58 5 4 6 4 4 0 4	58 41 42	59 40 41 41	8 4 4 1 2 8 1 4 5 6	62 63 46 48 37 36		62 49 49 36 36	32	- 62 J 50 2 34	60 48 32	63	65 46 	174	64 46 33	59 42 34	97 37	6v 48 36	6.C 47 37	59 47 37	3 4 4 6	33 33	7 4 7 C	47 42 36	45 47 40 40 34 33		446 450 3448	47	7 57 45 3 36
January February	33	35	1 1 4	1 1 %	36 1	115	1 1 9		33 35		38 37  39 43	37	45 1 36		37 38  42 42		36 37	9 1 3	4.0 4.5 4.5	34 32 43	933	61.4	1 4 4	35 33		34 34		53 52		54 43
April May	56 52 72	55	58 20 7	56 59 71	54 5	255	54 5	55 5	56 52 72 74 78		51 53 67 64 76 70	6.00	200	57 62 76	5.4 7.5 7.5 7.5		55 58 66 65 72 72		65 64 66 67 73 75	63	63 64 66 65 73 71	592	5. 7. 7.	52 53 65 67 74 78		54 1 58 80 80 80		06 68 69 78 84 84		70 64 70 74
JulyAugust	86 79 72		78 78 70 7	77 7	76 77 73 69		76 79 74 76 68 73		71 71 78 77 72 73		71 76 78 80 75	78	3 72		70 78 74 73 68 67	76 74 64	75 73 68	7.9	81 71 70	78 75 66	78 79 75 77 60 64	92 50	77 70 61	80 80 72 73 60 60		43 83 72 73 55 64		40 77 75 76 67 64		78 78 74 75 67

#### OHIO RIVER MAIN STEM

μ 3-496.55. ALLEGHENY RIVER AT OAKMONT,

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

DRAIANGE ACC Stoure miles, approximately.

REMONDS AVAILABLE. --Chantel analyses: July to September 1963.

Water feemical analyses: July to September 1963.

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 for acidity are potential free and determined to Analyses were made on the maximum daily specific conductance for each month. Records of discharge are given for Allegheny River at Natrona.

	Organics the-Alkyl	COL-nois ben- or as zene CeHs sulfo- OH nate (ABS)		0.1	-: 	۲.	1	1	Ŧ.	-:	1	1	0.	-:	1	-
		- <del> </del>														
		는 프		5.7	4.5	5.9	8.4	6,1	5.5	5.8	5.4	5.9	5.1	6.3	5.8	5.6
	Specific conduct-	Acid- ance ity (micro- as mhos at H+1 25°C)		376 5.7	453	444	499	336	485	484	494	441	549 5.1	547	569	490
		Acidity (H+1		-	-	1	1	!	1	1	0.1	٥.	۲.	0.	7.	r.
	Hardness as CaCO <sub>3</sub>	Non- car- bon- ate		1	-	1	158	101	1	1	157	133	1	1	187	157
	Hard as C	Cal- cium, mag- estum		1	1	-	160	111	1	-	160	143	!	1	193	164
	phos-Dissolved	(residue at 180°C)		!	ì	T	310	200	1	1	319	273		1	359	303
63	I-sod	us as PO.		0.02	.05	10	ī	1	.08	•08	ľ	-	80.	.03		1
er 19	n,			ı	1	-	2.2	6.	1	1	4.1	2.6	1	I	4.8	4.2
ptemb	-luo-	ride (F)					_									
Chemical analyses, in parts per million, July to September 1963		(C1)		1	1	!	30	22	ł	!	35	32	ł	1	45	34
illion,	,	(SO <sub>4</sub> )		131	165	148	177	106	162	156	163	138	182	168	192	164
r m		9 # 8 m					7								- <b>6</b>	80
rts p	Bi-			¦ 		-		112		1	4	12	1	1	-w	
in pa	Po-	sium (K)														
alyses,	;	(Na)														
cal an		sium (Mg)		1		1	12	6.3	}	!	11	11		1	16	13
Chemi	Cal-	cium (Ca)		1	1	1	44	34	1	}	46	39	1	1	21	44
	Man-	ga- nese (Mn)		0.36	.92	.11	1	00.	2.1	96.	1.4	.18	1.4	.05	1.7	1.1
		(Fe)						00.0								
	Alu-	(AI)														
		(SiO <sub>2</sub> ) num														
	Mean	96		2990	2350	2420	3860	2390	3340	2280	2350	3250	1820	1930	2100	1660
	Date	of	July 5, 1963	(maximum weekly)	July 9 (maximum weekly)	weekly)	July 25 (maximum monthly)	monthly)	Aug. 4 (maximum 8/1-10)	Aug. 20 (maximum 8/11-20)	Aug. 22 (max1mum monthly)	Aug. 6 (minimum monthly)	Sept. 10(maximum 9/1-10)	Sept. 28(maximum 9/21-30)	monthly)	monthly)

OHIO RIVER MAIN STEM---Continued

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

	Aver-	age	81 79 75
		31	48 1 1 9
		30	84 79 66
		29	84 79 69
		28	84 79 70
		27	84 78 74
		26	
ı		25	81 83 77 76 71 72
		20 21 22 23 24 25	77
		23	80 73 72
963		22	81 78 75
r 1		21	80 81 77 78 76 75
ешре		20	83 78 76
Sept		19	82 78 75
Cemperature (°F) of water, July to September 1963		18	82 78 74
11y		17	80 79 78 73 74
ጘ,	Day	16	78 79 73
ter	_	15	80 79 75
f wa		14	80 80 76
6		13 14	80 47
°.		12	78 80 75
ture		1.1	79 82 75
era		10	80 80 75
remp		6	80 80 77
		80	80 81 78
		7	80 81 87
		9	80 78
		5	80 80 79
		4	82 82 78
		3	83 84 76
		2	82 84 75
		-	81 84 76
	Month	ionore.	JulyAugust

MONONGAHELA RIVER BASIN

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

LOCATION.—Let sity waterplant, at Elkies. Randolph County, 2.5 miles upstream from gaging station.

DRAINES, REA, --268 square miles above water plant; 272 square miles above gaging station.

BRAINES, 1860-8.—Water temperatures: January 1947 to September 1863 by name and days during winter months.

EXTREMES, 1962-8.—Water temperatures: Maximum, 787 July 1; mnihum, 327 bo many days during winter months.

EXTREMES, 1967-63.—Water temperatures: Maximum, 782 July 1; mnihum, freezing point on many days during winter months.

PARAMENS.—No appreciable inflow between waterplant and gaging station except during periods of heavy local rains. During flood periods part of the flow is diverted around the waterplant in a flood by-pass channel.

	Aver-	e.				
	Ϋ́	ag	54 41 35	34 33 41	53 61 67	72 72 66
-		31	33 15	33	121	201
1		30	3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	2 1 3	53 74	75 76 72 71 58 58
		56	35 37	33	54 66 74	75 72 58
		28	44 36 37	6 8 3 6 8 3	56 66 73	75 71 62
		27	40 34 37	333	54 65	74 72 61
		26	48.6 5.67	33 46	53 72	72 73 68 69 63 61
,,		25	35 35 35	33 46	50 70 70	72 68 63
196		24	4 8 4 0 3 5	4233	200	73 70 63
ber		23	52 40 36	833	5 8 8 8 8	71 69 63
ptem		22	53 37	36	60 58 69	71 69 63
water year October 1962 to September 1963		21	3 4 5 5	33 37	58 68 88	69 70 64
\$		20	56 42 34	8 8 8 8 8 8	6.0 6.0 6.8	74 70 66
196		19	33.38	333	69 69	75 70 67
er		18	59 444 33	6 6 9 9 6 6 9 9	59	73 71 68
cto		17	62 45 34	33	54 60 67	73 71 68
0	Day	16	33 43	33 41	51 62 65	72 72 65
Ã		15	62 41 33	33	50 60 66	70 73 64
ater		14	58 33 33	34	5 8 8 5 9 9	68 74 66
	ļ	13	933	38	46 58 63	70 74 69
water,		12	8 4 6 8 8 6	42 42 42	47 60 63	70 73 67
of w		=	33	33.4	46 67 66	70 72 66
ř		10	33 4 6	334	4 8 7 0 6 6	71 70 71 74 67 66
		6	56 44 33	333	50 65	71 71 67
Temperature		8	33 428	3333	52 63	72 71 66
mpe		7	35	883	51 65 64	70 70 68
F		9	36	333	52 64 62	69 74 69
		5	57 40 38	33	50	68 75 69
-		4	58 38	333	56 57 62	71 75 72
	1	3	56 40 36	888	58 52 69	72 71 75 75 27 27
		2	35 25	333	5 6 6 6 6 9 6 9 9 9 9 9 9 9 9 9 9 9 9 9	78 76 76 76 67 69
		-	54 43 36	33	45 70 70	
	Month	Month	October November December	January February March	April May June	JulyAugust

## MONONGAHELA RIVER BASIN--Continued

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

LOCATION. --About 750 feet upstream from dam, lock and dam 8 at Point Marion, Payette County, and 1.5 miles upstream from Cheat River. DRAINAGE AREA. --2,720 square miles.

RECORDS AVAILABLE.—Chemical analyses: October 1965 to June 1963 (discontinued).

\*Rater temperatures: October 1965 to June 1963. discontinued).

\*Rater temperatures: October 1965 to June 1963.—Dissolved solide: Maximum, 446 ppm Apr. 2-30; minimum, 120 ppm Apr. 2-30.

\*Rater femperatures: Maximum, 21 ppm Apr. 2-30; minimum, 65 ppm Nov. 1-30.

\*Rater temperatures: Maximum, 78° June 30; minimum, 620 ppm Apr. 27; minimum daily, 100 ppm Apr. 27; minimum, 100 ppm Apr. 2-7, 9-10, 1958.

\*Rater temperatures: Maximum, 78° June 30; minimum, 520 ppm June 1-10, 1966.

\*Rater temperatures: Maximum, 287 ppm Nov. 7-8, 1969; minimum, 54 ppm June 1-10, 1966.

\*Rater temperatures: Maximum, 287 ppm Nov. 7-8, 1969; minimum daily, 1,240 micromhos June 12, 1962; minimum daily, 100 ppm Apr. 2-7, 1962.

\*Rater temperatures: Maximum, 87° ppm Nov. 7-8, 1969; minimum daily, 100 ppm Apr. 2-7, 1962.

\*Rater temperatures: Maximum, 87° ppm Nov. 7-8, 1969; minimum daily, 100 ppm Apr. 2-7, 1962.

REMARKS.--Values for iron and manganese are in solution when analyzed. Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. Acidity values reported are potential free and determined to pH 7.0. No discharge records available.

		Col-											
		Hd											
	Specific conduct-	ance (micro- mhos at 25°C)	604	194	299	247	288	241	750	298	337		397
		R ty						0.2					
	ress rco,	Non- ity (carbon- as ate H+1	166	9	06	92	101	78	221	168	100	,	118
	Ha	Cal- cium nagne sium	166	65	06	92	101	78	221	168	100	,	119
	Dissolved	solids (residue at 180°C) n	351	120	175	148	179	131	446	331	189		231
963	;	trate (NO <sub>3</sub> )	4.0	1.5	1.2	1.0	1.1	9	4.	۲.	6.		8.0
June 19	i	ride (F)	0.2	т.	•	۰.	٥.	۳.	'n.	4.	.3		0.2
Chemical analyses, in parts per million, October 1962 to June 1963		Chloride (C1)	6.0	5.0	2.0	4.0	5.0	2.5	3.0	4.0	6.5		4.6
n, Octobe		Sulfate (SO4)	243	71	108	93	112	95	307	230	120		154
millio	i	bonate (HCO <sub>3</sub> )	•	9	0	0	0	0	0	0	٥		-
ts per	Ро-	tas- sium (K)				_							
s, in par		Sodium (Na)											
nalyse	Mag-	ne- sium (Mg)											
mical		cium (Ca)											
cp	Man-	ga- nese (Mn)	1.4	.36	9.	.43	.28	.38	.44	1.1	.68		0.64
		Iron (Fe)	1.3	1.1	1,3	. 97	5.6	1.7	5.3	5.9	1.0		2.0
		trum (A1)											
		Silica (SiO <sub>2</sub> )											
		Mean discharge (cfs)											
		Date of collection	Oct. 1-31,1962	Nov. 1-30	Dec. 1-28	Jan. 3-31,1963	Feb. 1-28	Mar. 1-31	Apr. 2-30	жау 1-31	June 1-30	Time-weighted	average

	3.4	9.0	3.2
	892	278	842 3.2
	1	ŀ	1.6
	244	72	1
Нď	244	72	1
m monthly	532	150	
minim	8.0	4.	1
, and	8.0 0.4	۰.	1
nalyses based on maximum monthly and minimum monthly specific conductance, and minimum monthly	8.0	2.0	1
specific o	376	66	1
onthly a	0	0	1
imum m			_
and min			
monthly			
aximum			
uo pa	l	ł	1.4
ses base	ı	1	2.2
Analy			
	Oct. 1, 1962 (maximum conductance)	(minimum con- ductance)	mum pH)

MONONGAHELA RIVER BASIN--Continued

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

Analyses based on maximum monthly and minimum monthly specific conductance, and minimum monthly pH--Continued

		Col- or																	
		Hd	4.6		5.4	4.2		3.6	5.0	3,6		3.8	5.0	3.8		4.0	4.5	3.9	4.1
	Specific conduct-	ance (micro- mhos at 25°C)	512		106	209		498	147	497		446	128	301	ţ	429	160	314	385
	- 3		1		1	0.2		1	!	9.		ŀ	1	4.		1	1	4.	
	nardness as CaCO,	Non- carbon- ate	206		32	1		141	48	ł		134	41	!	,	146	53	!	130
,	as C	Cal- cium, magne- sium	206		35	1		141	49	ł		134	44	į	,	146	53	!	130
_	Dissolved	solids Cal- (residue cium, at 180°C) magne- sium	334		69	1		302	110	1		268	98	1		272	102	1	223
tinned	;	trate (NO <sub>3</sub> )	1.0		1.5	1		1.6	2,1	1		.7	1.9	1	•	×.	1.4	ł	9.
3Con	î	ride (F)	0.1		۰.	1		٥.	۰.	1		0.	0.	ı	•	N.	٦.	l	e,
to June 1963Continued		Chloride (C1)	11		2.3	1		0.6	3.0	!		8.0	5.0	ł		0.9	3.0	1	4.0
er 1962		Sulfate (SO <sub>4</sub> )	220		37	1		192	52	1		172	45	ŀ		182	58	1	161
, Octob		bonate (HCO <sub>3</sub> )	0		4	1		0	7	ŀ		0	4	į		0	0	1	0
1111on		tas- sium (K)																	
in parts per million, October 1962		Sodium (Na)												-					
	Mag-	ne- sium (Mg)												_					
nalyses	7	cium (Ca)																	
Chemical analyses,	Man-	ga- nese (Mn)	1		١	0.26		1	}	.71		1	1	.36		1	1	.38	1
Che		Iron (Fe)	1		ŀ	1.1		1	ł	4.4		ŀ	1	2.5		ŀ	į.	3.0	1
Ì		inum (A1)																	
Ī		Silica (SiO <sub>2</sub> )																	
		discharge (cfs)												~					
	,	Date of collection	Nov. 3, 1962 (maximum con- ductance)	Nov. 27 (mini-	ance)	MOV. II (MINI- mum pH)	Dec. 19 (maxi-	ance)	mum (conduct-	mum pH)	Jan. 28, 1963	ductance)	mum conduct- ance)	Jan. 11 (mini- mum pH)	Feb. 3 (maxi- mum conduct-	Feb. 7 (mini-	mum conduct- ance)	reb. 19 (mini- mum pH)	Mar. 19 (maxi- mum conduct- ance)

4.3     .88    6     103     58     58        4.3     .88	189 4.5	3.8	3.4	80 4.1	3.4	3.5	274 4.0	792 3.4	0 3.7	160 5.2	_
4.3     .88 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>											
4.3       .88       .8		_			1.3		_	1.5			
4.3     .88 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>!</td> <td></td> <td>52</td> <td></td>								!		52	
4.3 .88	58	1	376	79	1	221	69	1	146	54	
4.3 .88	103	;	746	150	;	456	124	1	290	92	
4.3 .88	9.	1	ıç.	3.	1	г.	27	!	6.	1.1	
0 57 0 508 0 508 0 104 0 324 0 90 185 185		1						1			
2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.0	!	5.0	2.0	1	4.0	2.0	1	3.0	4.0	
	57	1	508	104	ţ	324	06	1	185	58	
4   6   6   1   1   1   1   1   1   1   1	0	ļ	0	0	ł	0	0	1	0	73	
4   6   6   1   1   1   1   1   1   1   1											_
4   6   6   1   1   1   1   1   1   1   1											
4   6   6   1   1   1   1   1   1   1   1											_
4 0 10		88.	1	1	2.3		1	1.5		1	
7, 1963  wm con- ce)  3 (mini- nduct- (mini-	1	4.3	1	ŀ	9.6	ŀ	1	5.6	1	1	
7, 1963 mm con- ce) (ce) (ce) (ce) (ce) (ce) (ce) (ce)											_
7, 1963  wm con- ce)  7 (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini- nduct- (mini-											
7, 1963  (maxi-  ) (maxi-  ) (mini-  ) (mini-  (mini-											
	Mar. 17, 1963 (minimum con- ductance)	mum pH)	Apr. 27 (maxi- mum conduct- ance)	ance)	mum pH)	May 17 (maxi- mum conduct- ance)	mum conduct-	-tutm) CI Kww	June 30 (maxi- mum conduct- ance)	ance)	4 (mini-

MONONGAHELA RIVER BASIN--Continued

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

	Aver-	age	62 37	35 43	51 52 68
		31	24!!	133	131
		30	55	33	50 64 78
		29	211	4 1 3	48 75
		28	37	333	63
		27	36 37	4 9 3 3 3 4 4 6 4 6 6 4 6 6 4 6 6 6 4 6 6 6 6	47 62 63 74 75
		19 20 21 22 23 24 25 26 27 28	35	33	47 61 73
ļ		25	37 35	32 34 36 45 46	47 47 60 61 72 73
		24	36		70 70
2		23	35	37 32 33 36 43 45	62
136		22	34.0	333	63
nue		21	34 45	34 33 44 43	53
9		20	34	338	
795		16	95 35 35 35	37 38 33 35 48 49	55 51 47 47 69 70
Ä		18	3 4 6 3 6 5 6	8 6 9 8 6 9	51 66
ope		17	34	37 38 34 33 47 46	50
8	Day	16	33 33	37	64 65 65
er,		15	65 47 34	37 34 34 43 43	49 48 46 43 67 65
Wa		14	65 65 48 46 34 33	39 38 34 35 42 45	4 8 4 8 6 7
ö		13	34	39 38 42 45	50 49 47 48 65 67
٤		12	60 4.8 35	37 40 35 35 40 41	52 50 48 47 68 65
Temperature ('F) of water, October 1962 to June 1963	İ	11	36	37 40	52 48 68
rati		10	64 47 38	35 34 34 34 39 40	48 51 67 67
ешь		6	65 64 48 47 38 38	35 34 39	4.8 6.7
Ä		8	60 47 39	35 35 40 39	54 54 44 65 67
		7	65 60 48 47 39 39	35 35 35 33 40 39	5.0
		9	65 64 50 48 44 42	34 35 33 33 40 40	52 52 45 47 69 65
		5	65 50 44	4 6 0 4	52 45 69
		4	65 49 40	36 4	52 44 65
		2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18		33.5	53 52 44 44 66 65
		2	63 64 65 55 54 50 43 42	32 33	46 45 65 68
		1	63 55	32	
	Month	Wolfer	October November December	January February March	April May

MONONGAHELA RIVER BASIN--Continued

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

Specific conduct-	Fuor Tride trate (residue cium, carbon- as (micro- pH or or sum (NO <sub>2</sub> ) at 180°c) magne- ate PO <sub>4</sub> mhos at sum sum sum sum sum sum sum sum sum sum	3 38 6.6 5
Phos	n- us on- as	2 0.03
ardness s CaCO,	n, carb	481
E E	Cal C) magn	32
Dissolve	solids (residu at 180°(	
;	INO. (NO.)	0.2
i	ride ride (F)	
	Chloride (C1)	1.5
	Sulfate (SO4)	8.8
í	tas- bonate sium (HCO <sub>3</sub> )	14 20
Pot-	tas- sium (K)	1.8 0.5
	Sodium (Na)	
Mag-	ne- słum (Mg)	6.5 0.4
ā	ctum (Ca)	6.5
Man-	ga- nese (Mn)	
	Iron (Fe)	0.00
1	inum (Al)	
	Silica Inum (SiO <sub>2</sub> ) (Al)	3.4
	discharge (cfs)	185 64
	of collection	May 10, 1963 July 10

MONONGAHELA RIVER BASIN--Continued

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

38 36 36 38 38 38	38	38 38	38 38 38 38 38 38
38 38 38 39	38	38 38	38 38
58 58 56 56 56 56 56 56 56 56 56 56 56 56 56	58	54 54 54 54 54 58 58 58 66 66 66 66	54 54 54 58 58 58 66 66 66 66
8 68 68 68 68 68 68 68 68 68 68 68 68 69 60 60 60 60 60 60 60 60 60 60 60 60 60	57 68 68 72 70 69 54 64	66 66 67 74 74 72 64 54 64 64	67 72 64 64

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.

BRANAGE AREA.--1,411 square miles.

RECORDS AVAILABLE.--Water temperatures: October 194% to September 1963.

EXTREMES, 1948-63.--Water temperatures: Maximum, 85°F July 30, 1949, July 28, 1952, and Aug. 6, 1955; minimum, 33°F on several days during winter months.

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

	Aver-	age	111	111	1 8 1	, , ,
		31	314	34	1 8 1	<u>8</u>   1
		30	58	33 33	56 67 80	81 76 68
		29	53	33	67	77
		28	34	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	19	171
		27	34	1 4 3	64 78	17 07
		26	58 44 35	1 404	765	81 76 70
3		25	11.59	335	56 65 77	81 70
196		24	35	# 1 1	56 79	79
ber		23	0.44	34	56	80 79 78 68 68
Temperature of of water, water year October 1962 to September 1963		11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	62	34	165	78
Sep		7.	444	4 4 3	97	78
to		20	36	1 404	65	78 73
1962		6	63 46 36	39	55	80 77 78 73 73
er		18	63	35	78	79
ctob		17	36 36	36	55 55 65 65 74 78	77 79
0	Day	16	48 4 8	36	53 54 64	75 76 77 78 72
yea		15	48 65	37 36	53 54 64 64	75 76 77 78 72
ter		14	37	333	132	77 76
, wg		13	46	38	62	77
ter		12	3.8	38	102	79 77 74
f wa		=	63 64	35	53 62 70	78 79 77 74 74
F		10	64 63	35	54 67 68	75 78 76 76 76
re		٥	464	35 35	54	75 76 76
atu		8	464	34	53	75
npe		7 8	1004	34 34 34 34 35 36	59	78 78
Te		0	100	34	51 58 58 71 72	77 79 79 74 74
		5	68 52 43	34 4	51 58 58 71 72	77 79 79 74 74
		4	69	34	51 58 71	7.5
		3	68 69	34	54 57 71	78  76 75
		2	58	411	51	81 80 76
		_	57	35	50 51 57 57 71 71	80 81 80 80 76
	4	Month	October November December	January February March	April May. June	July August September

## MONONGAHELA RIVER BASIN--Continued

## 3-750. MONONGAHELA RIVER AT CHARLEROI, PA.

LOCATION. --At intake to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at Charlerol filtration plant, Washington County, 1 mile downstream from

bridge not interstate Highway 70.8, and 0.8 and is upstream from gaging station.

DAMINAGE RAL.—5.213 square alloss (at gaging station).

RECORDS WAILABLE.—Chemical analyses: July to September 1963.

Where respectatures: July to September 1963.

REMARKS.—Paparatures: July to September 1964.

REMARKS.—The station and records of specific conductance for some and externation and records of specific conductance of all y samples are available in the district of office at Columbus, 70 biol. Analyses were made on the maximum daily specific conductance for each week or loads period and on the maximum and minimum daily specific conductance for each month.

Phe- Alkyl nols bensulfo nate (ABS) Organics zene 0.0 1 1 ٥. 0 1 1 o. ٥. ì ŀ as 6Hg OH Colö 3.8 3.9 3.9 3.9 4.0 4.2 3,8 864 3.6 3.8 3.7 Ηd mhos at 25°C) 448 292 969 383 Specific conduct-195 260 788 525 175 (microance lc id-0.8 9 ity as 199 235 84 car-bon-Hardness as CaCO, ate mestum 199 235 86 mag-80 191 8 Calcium, Phos-Dissolved
phor-solids
us (residue
as at 180°C) 171 208 188 153 188 90 0.08 •04 ŧ ł 07 ŀ 90 .41 ï ; • September 1963 (NO) trate 1.2 2.0 8 8 ż ŧ 1 1 ł ŀ Fluoride (F) 2.0 0.9 8.0 4.0 ļ Chloride July to 9 ĵ in parts per million. Sulfate (SO4) 228 194 304 108 347 174 120 341 136 192 262 S S g at 0 0 0 -uoq 0 1 0 car-Po-tas-sium (K) Chemical analyses, Sodium (Na) 9.9 Mag-ne-sium (Mg) ł 6.1 ì ŀ į 19 15 16 Cal-ctum (Ca) 20 23 1 55 22 63 ŀ 1 Man-ga-nese (Mn) 66 74 78 ŧ 52 9 ۲. Fe) Alu-Silica (SiO<sub>2</sub>) discharge 1320 1600 3060 3480 1820 (cfs) 1960 780 4690 monthly)..... Sept. 30(maximum monthly)..... July 20 (maximum Aug. 19 maximum 8/11-20)..... Aug. 21 (max1mum 8/21-31)..... Sept. 8 (maximum 9/1-10)..... Sept. 12(maximum 9/11-20)..... Sept. 7 (minimum monthly)..... weekly)..... July 28 (maximum monthly).... (minimum monthly).... Aug. 27 (minimUm monthly)..... weekly)..... lug. 8 (maximum collection July 6, 1963 (maximum July 13

MONONGAHELA RIVER BASIN--Continued

MONONGAHELA RIVER BASIN--Continued 3-750. MONONGAHELA RIVER AT CHARLEROI, PA.--Continued

MONONGAHELA RIVER BASIN--Continued

3-765. YOUGHIOGHENY RIVER AT FRIENDSVILLE,

LOCATION.—-Temperature recorder at gaging station, 0.7 mile upstream from bridge on State Highway 42 at Friendsville, Garrett County, and 1.5 miles upstream from Bear Creek.

COUNTY, and 1.5 miles upstream from Bear Creek.

DRAINAGE AREA,—-295 square miles.

RECORDS AVAILABLE.—-Water temperatures: October 1962 to September 1963.

EXTREMES, 1652-63.—"Water temperatures: Maximum, 80°F buly 28; minimum, freezing point on many days during winter months.

REMARKES,—Records fair, probably because of friction in recorder.

	Average	AG TOTAL OF	57 53	<b>44</b> 3	33	333	32	40 38	51 47	59 55	62 58	11	72 66	
		31	47	11	33	32 32	11	50	11	58	11	77	68	
İ		30	4 4 60 rU	36	333	32	1.1	4 4 6	53	28 60	73	76	99	
		29	50	39 36	33	32	1 1	47	54	59	09 90	77	69	
		28	0.4	36	3.4	32	32	4 7	53	52	99	80	72	
		27	44	38	33	32	32	4.5	51	57	67	77	72	
		26	4 6 6 8 9	37	32	32	32	46	50	53	99	75	71	
		25	4 t 6	39 37	32	32	32 32	46	4 5	55	58	73	72	
203		24	52	40	32	32	32	39	50	55	58	7.1	69	
- !		23	54 52	404	33	33	32	41	52	54 52	63	72	71	
		22	50	43	33	32	32	38	57	55	54	75	71 67	
September 1963		21	57	43	33	36	32 32	40 37	58	56 54	59	72	69	
2		20	57 53	41	36	37	32	41	58	59	59	7.1	99	
202		6	57	42	33	35	32 32	43	50	61	60 56	74	72	
5		18	5.8	4 9	33	32	32	44	505	58	6 c 55	74	73	
cope		17	53	4 4 4	33	32	32	44	51	58	54	1 1	71	
3	Day	16	66	44	333	32	32	4 J	4 5	62	5.4	11	68	
year October 1962		15	53	44	99	33	32	38	47	59	5.5	11	68	
water		4	61 56	44	333	34	32	41	L 4 4	61	57	1.1	99	
		-3	64	44 38	333	37	32	41	4 4	58	5.5	1.1	71	
water,		12	64	43	33	37	33	37 36	4.3	54	1.1	11	75	
		Ξ	62 57	4 4 4	9.9	36	34	3.8	4 4 6	56	1 1	11	75	
io.		2	61 58	4 4 2	933	3.5	32	39	46 43	67 58	63	1 1	77	
a a		6	62 59	4 4 5 4	33.3	34	32	39	4 9	6.4 5.8	66	- {- }-	73	
arni		æ	62 58	4 4 5 4	35	34	33	39 35	4 6	63 56	4,9	11	72	
Temperature		7	59	4 5	33	33	35	35	4 4 4 4	61 55	62 59	11	70	
5		9	61	7 H	4 % 0 4	34	34	34	4.8	63	95 29	1 1	71	
1		5	61	43	41	32	32	33	46	53	57 55	11	73	
		4	59	41	33	32	32	34	51	52	58	11	77	
		က	5.00 0.00	45	3.9	32	32	34	54	54	58	1.1	73	
		7	6.0	4 6	36	33	32	32	53	5.2	64	69	75	
		-	57	45	36	33	32	32	47	50	58	70	77	
			::	: :	1 1	::	::	::	::	::	::	::	::	
	Money	MORG	October Maximum Minimum	November Maximum Minimum	December Maximum Minimum	anuary Maximum Minimum	February Maximum Minimum	March Maximum Minimum	April Maximum Minimum	May Maximum Minimum	June Maximum Minimum	mnm	August Maximum Minimum	

Col-

n n n n n

25 57

MONONGAHELA RIVER BASIN--Continued

3-825. YOUGHIOGHENY RIVER AT CONNELLSVILLE, PA.

LOCATION --At gaging station at downstream side of Crawford Avenue Bridge in Connellsville, Fayette County, O.8 mile upstream from Mounts Creek. DEALNAS AREA.--L.528 equates mailse. Rovember 1962 to September 1963.

6.3 6.3 6.4 6.3 5.9 6.1 6.5 펁 Total Specific conduct-acid-ance ity (micro-as mhos at H+1 mhos at 25°C) 136 101 105 105 121 solids Cal- Non- if (residue cium, carbon- a at 180°C) magne- ate H 39 27 38 39 232 83 Hardness as CaCO, 46 32 41 42 39 34 31 Dissolved 80 65 67 84 60 63 65 Ni-trate (NO<sub>3</sub>) 0000 3.1 2.4 1.4 1963 Fluo-ride (F) Chemical analyses, in parts per million, November 1962 to September 00011 8.464 20000 23.0 Chloride (C) Sulfate (SO<sub>4</sub>) Bicar-bonate (HCO<sub>3</sub>) **∞ 10 9 4** € 107 1.0 Pot-tas-sium (K) 8.08.48 3.08.48 2223 Sodium (Na) 8 9 9 8 8.2.2.1 9.4.4.0 Mag-ne-sium (Mg) 9.6 9.6 9.2 Cal-ctum (Ca) Man-ga-nese (Mn) 88811 03 88811 8888 Fe) Alum-inum  $\widehat{\mathbf{z}}$ Silica (SiO<sub>2</sub>) 7.04 4 7.08 | E 3.7 1.8 1.8 1.8 Mean discharge (cfs) 3320 2020 2020 2000 2000 830 820 900 May 28...... July 2..... Aug. 7..... Sept. 12.... Date of collection Nov. Dec. Jan. Feb.

#### OHIO RIVER MAIN STEM

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

LOCATION.—At intake line to Obio River Valley Water Sanitation Commission (ORSANCO) monitor at the Duquesne Powerplant at South Heights, Allegheny County, I. 6 miles above Ambridge-Woodian Bridge.

DRAIRAGE ALEA.—15.95 Square miles, approximately.

BRAIRAGE MAN.—15.95 Square miles, proximately.

RECORDS AVAILBLE.—Crematel analyses by the proximately of

	Organics	zene zene sulfo nate (ABS)	-	•	۲.	1	1	۳.	٠.	1	1	٦.	٠.	ł	i
		nols as CeHs OH													
		- -		•	_						_				
		Hd	a u	:	418 5.7	513 4.7	8.8	630 4.5	865 4.2	4.2	6.0	524 4.5	580 5.3	714 6.7	470 4.3
	Specific conduct-	ance (micro- mhos at 25°C)	104			213	356		-	685	485				1
		H B IT B	-		0.	1	T	'n	4.	ű.	٠.		٠.	°.	.5
	Hardness as CaCO,	Non- car- bon- ate		!	1	158	111	1	1	213	140	!	ł	200	140
		Cal- cium, mag- nesium			-	160	111	1	1	213	150	-	1	266	140
		solids (residue Cal- at 180°C) cium, mag-		!	ł	318	223	ł	1	422	296		1	480	287
1963	Phos-	ass 70			.33	i	ŀ	.13	.18	1	ł	.17	.30	1	1
mber	Z - CII	(NO.)			ī	7.2	8.4	ł	I	4.9	5.6	ŀ	ı	12	5.2
Sept	910-	ride (F)													
Chemical amalyses, in parts per million, July to September 1963		Chloride (C1)		!		24	14	1	1	22	24	ı	1	30	17
million		Sulfate (SO4)	971	7.40	146	184	126	250	254	262	171	193	306	233	169
Per		G at G		_	_	~				-	21				0
parts	Bi-			 				 			12		!	& 	
t u	۳.	stum (K)													
amalyses,	:	Sodium (Na)													
nical		sium (Mg)		1	1	12	8.4	!	1	16	11		1	16	11
Che	<u>غ</u>			<u> </u>	1	4	33	1	1	29	42	1	1	98	38
	Man-	ga- nese (Mn)		i	1	ì	ł	1.9	2.2	2.1	1.5	1.3	1:4	9	- 1.0
		Fe)		ļ	;	1	}	}	;	0.87	3.9	1	;	;	ı
	Alu-	mum (Al)													
		Silica (SiO <sub>2</sub> )												-	$\neg$
	Mean	3e													
	Date	collection	July 4, 1963 (maximum	July 13 (maximum	weekly)	monthly)	monthly)	Aug. 10 (maximum 8/1-10)	Aug. 20 (maximum 8/11-20)	Aug. 21 (maximum monthly)	Aug. 1 (minimum monthly)	Sept. 14(maximum 9/11-20)	Sept. 25 (maximum 9/21-30)	monthly)	Sept. 11(minimum monthly)

Aver-

78 74

OHIO RIVER MAIN STEM -- Continued

31 78 11 30 30 83 71 83 76 70 83 76 72 82 75 70 78 71 79 72 77 71 3-860.6. OHIO RIVER AT SOUTH HEIGHTS, PA. -- Continued Temperature ('F) of water, July to September 1963 80 76 74 75 75 81 75 74 76 75 17 18 78 79 78 78 75 75 Day 76 75 74 77 75 75 78 78 75 78 79 76 11 12 77 78 80 74 77 76 81 77 æ 81 77 79 76 81 76 83 78 83 93 76 က 82 79 81 77 July ...... August ..... September ....

Month

#### BEAVER RIVER BASIN

## 3-940, MAHONING RIVER AT LEAVITISBURG, OHIO

DICATION — Temperature recorder at gaging station on highway bridge at Leavittsburg, Trumbull County, 300 feet downstream from DAIMAGE And 12 miles downstream from Eagle Creek.

PRINTER.—150 square miles analyses: October 1851 to September 1853

RECORD AVAILABLE——Cremated analyses: October 1851 to September 1853, April 1843 to December 1945, October 1946 to September 1948, unpublished. RYREERS, 1825-25. The point on many days units processor of March 2007, April 1843, April 1843, April 1843, April 1843, April 1843, April 1843, April 1843, April 1843, April 1844, A

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

	Aver-	age	57 56	4 4 7 5	33	32	32 32	36 35	52 49	61 59	71	76	72 70	99
+	_	31	2 4 4 5	11	88	33	11	8 9 9	11	61	11	78	04	11
		30	2 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	37	32	33	11	6.5	52	63	76	97	029	62
		562	45 4	37 3	32 3	333	Ħ	44	5.4	63	73	78 7	69	62 6
		28	4 4 2	38	32	33	32	2 4 4 5	55	63	75	80	69	62
1		27	45	39	33	32	32	417	4.04	62	76	908	70	62
		26	6 4 9	39	32	333	32	42	51	61	75	79	20	19
		25	55	40	32	32	32	39	0 9 4	58	73	77	02	09
		24	54	41	32	333	32	39	64	58	71	76	72	61
1		23	56	42	32	33	32	36	525	58	70	75	72	63
		22	57	245	32	33	32	37	57	62	70	77	72	63
aph		12	60	41	32	33	32	38	57	62	70	77	70	9 4
thermograph		20	09	42	32	32	32	38	57	63	71	77	69	99
her		13	960	43	32	32	32	38	58	63	72	77	70	65
ğ		8	61	44	32	32	32	38	58	62	71	78	70	67
uate		17	62	4 4	32 32	32	32	37	55	62	70	76	70	99
-act	Day	91	63	7 7 7	32 32	32	32	33	64	58	70	73	70	63
alcohol-actuated		15	62	44	32 32	32	33	33	50	60 59	69	73	69	66 64
0 T		4	61	<b>4 4 4 7</b>	33	32	33	33	44	57	6.8	74	70	66
		13	62	4 4	33	32	33	32	4 4 6 6	58	65	74	72	69
ethyl		21	62	<b>4 4 4</b>	333	32	33	33	4 4 6 0	61	71	72	73	6 9
(Continuous		=	62	7 7 7	34	32	32	33	4 6	65	73	70	73	6.9
ti Di		2	63	44	34	32	32	33	8 4 9 4	99	74	71	74	70
Con		6	62	4 4	34.	32	32	32	50	66	74	72	73	70
		80	62	43	34	32	33	32	51	59	74	73	76	69
		-	62	44	35	32	33	32	51	57	71	73	75	68
		9	62	4 5	35	32	32	32	50	56	71	72	75	69
		2	60	4 7 4 4	3.5	32	32	32	50	58	69	74	76	69
		4	61	4 4 5	35	32	33	32	56	53	6.8	75	76	69
-		6	6.8	4 4	35	32	33	32	2 4 4 4	54	68	77 75	77	69
		2	58	4 4 5	37	33	32	32	50	6.4	99	77	77	69
		_	59	4 5 5 5	37	33	323	32	50	52 49	66	78	77	6 9
				::	::	::	::	::	::	::	::	- ! !	::	: :
	Month	Month	October Maximum Minimum	Maximum Maximum	December Maximum Minimum	January Maximum Minimum	Maximum Minimum March	Minimum	April Maximum Minimum	Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### BEAVER RIVER BASIN--Continued

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

LOCATION. --At Washington Street Bridge at Lowellville, Mahoning County, 300 feet downstream from gaging station, 1 mile upstream from Ohio-Pennsylvania State

October 1951 to September 1953, October 1956 to June 1963 (discontinued). line, and 3 miles downstream from Yellow Creek. RECORDS AVAILABLE . -- Chemical analyses: DRAINAGE AREA. -- 1,076 square miles.

PREFECT CONDUCTIONS: OCTOBET 1943 TO SEPTICATE TO THE TOTAL

ŀ
Man-
Iron ga- Cal- ne- (Fe) nese (Ca) (Mg)

BEAVER RIVER BASIN--Continued

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

Analyses based on monthly extremes of specific conductance

					Che	mical	analyse	s, in par	ts per	millior	1, Octobe	Chemical analyses, in parts per million, October 1962 to June 1963	June 18	63							
	Ä				Man-	3	Mag-		Po	i			i	;	Dissolved	Hardness as CaCO <sub>3</sub>	ness ICO3	4049	Specific Conduct-		Am- monta
Date of collection	discharge (cfs)	Silica (SiO <sub>2</sub> )	inum (A1)	Iron (Fe)	ga- nese (Mn)	cium (Ca)	ne- sium (Mg)	Sodium (Na)	tas- sium (K)	bonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (C1)	ride (F)	trate (NO <sub>3</sub> )	solids Cal- (residue cium, at 180°C) magne- sium	Cal- cium, magne- sium	Non- carbon- ate	1 ty (H <sup>†</sup> /)	ance (micro- mhos at 25°C)	Нď	nitro- gen as NH <sub>4</sub>
Oct. 21, 1962. Maximum	251									108	233	54	1.6	0.2	542		174	1	898	7.2	0.5
Oct. 3, Minimum	313									10	214	38	3.8	22	433	212	204	1	673	6.3	2.0
Nov. 23, Maximum	240							10 41		118	230	54	1.1	4.	498	260	163	- {	856	7.0 111	11
Nov. 13, Minimum	476									24	232	53	1.0	39	516	260	240	}	758	6.9	ĸ.
Dec. 31, Maximum	251									80	300	116	°.	29	698	302	295	!	1060	5.4	1
Dec. 4, Minimum	255									2	208	40	1.7	28	448	211	210	1	652	5.2	ŀ
Jan. 24, 1963 Maximum	244									88	297	110	1.0	Ν.	678	302	235	1	1140	Į į	}
Jan. 3, Minimum	251									0	302	118	1.0	32	712	302	302	1	1060	1	1
Feb. 3-4, Maximum	287									87	296	117	1.4	27	089	300	298	ł	1110	I	ı
Feb. 22-24, Minimum	291									30	88	20	.7	8.9	200	122	86	1	330	1	1
Mar. 30, Maximum	1750									0	275	51	2.4	4.0	496	234	234	0.3	831	4.1	1
Mar. 4-5,	1525									34	98	20	5.	7.1	222	122	94	1	329	ŀ	ŀ
Apr. 11, Maximum	394									•	272	20	1.4	4.8	492	235	235	0.2	838	4.2	!
Apr. 26, Minimum	712	-			•					2	178	38	·	12	360	183	182	.1	572	4.7	!
May 17, Maximum	394									0	256	52	1.1	6.1	468	232	232	2	808	2.	!
May 3,	889									4	187	43	9.	13	374	204	201	.1	601	5.4	ł
June 18, Maximum	394									0	282	42	6.	'n	482	248	248		790	4.5	1
June 13, Minimum	539									40	150	39	.7	17	342	194	191	1	556	7.0	1

59

## BEAVER RIVER BASIN--Continued

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

Temperature (°F) of water, water year October 1962 to September 1963

Ι.	. 1												
4 202	age	79	6.5	61 58	8 S	58	4 5	70	8 9	92	90	818	84 79
	31	71	11	52	8 9	11	55	11	8 8 3	11	88	84.	11
	30	71 67	71	53	58	1 1	56	75	83	888	88	8 1 8 1	80
	29	70	70 66	58	52	11	55	77	84 79	97	197	85	83
	28	68	69	58	52	6.1	52	78	9 4 4	96	98	86	83
	27	68	68	54	57	61	52	76	85	93	93	86	48
	26	72	79	56	57	59	50	70	83	97	9 5	8 8 8 0	84 76
	25	17	63	56	5.5	56	9 4	69	8 9 4	94	91	8 80 80	82 74
	24	76	63	52	55	58	47	63	88	9.5	8 6	8.2	80
l	23	78	62	58 57	5.5	59	4 4 4 4	64	86	90	90	8 2	80 76
	22	7.5	68	5.0	53	5.9	44	65	8 8 1	98	89 93	83	8C 7.7
Q d	21	79	68	59	53	58	44	9 6 6	85	95	90	83	4.08
thermograph	20	82	66	63	20. to	59	4 4	40	87	94	90	81	8.4 8.4
e rii	19	83	6.8	63	500	58	4 4	73	84	95	93	81	88
	18	81	40	58	60	61	4 2 4 2	80	8 8 4	93	93	83	87 79
ate	17	83	71 64	59	57	58	42	980	88	90	93	85	78
actu	91	83	72	59	52	57	4 4	77	90	91	85	81	7.7
alcohol-actuated	15	80	69	60	50	61	39	77	848	96	785	85	80
Ico	4	90	66 61	60	51 50	62	39	74 71	86	89	87	82	81
	13	83	61 58	59	55	61	4 0	74	83	86	98	83	82
ethyl	12	83	58 57	69 59	56	99	4 4 1 2	72	78	87	92	83	86 74
	=	87	58	58	565	56	4 1 4 0	717	81	8 8 8	89	83	8 1 8 1
Continuous	2	84 79	68 61	5.0	6.5	2.6	39	6.5	92	88	8 2 8 2	83	87
Sont	6	80	75	59	63	5.5	39	65	98	97	86	84	83
٦	8	82	7.5	69	64 60	56	38	67	8 8	98	83	8 8	84
	-	81	72	5.8	09	54	3.8	67	87	95	8 8 8 4	808	81
	9	78	72	58	61	52	4 m	66	84 77	96	8 6	8 1 8	82
	5	83	72	71	62	55	4 2	63	81	92	900	9 4 0	81
	4	85	70	7.1	62	52	57	69	81	86	98	7.8	81
	3	82	71	63	96	4 9 4 9	5.5	69	77	86	908	86	83
	2	81	72	68	56	8 4	5.6	999	7 7 1	888	6.89	8 8 9 4 8 9	8 8 3
	<u></u>	. 81	. 72	. 71	52	. 58	. 61		6.9	8 8	9.80	8 8	. 83
	Month	October Maximum Minimum	Maximum	Maximum	January Maximum Minimum	Maximum	March Maximum Minimum	April Maximum Minimum	Maximum	Maximum	July Maximum Minimum	Maximum	September Maximum Minimum

### 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 at Eastvale, Beaver County, 0.5 miles downstream from bridge on State Route 588. MAINCE AREA.—3.106 square miles (at gaging station). RECORDS VAILABLE.—Chemical analyses: 1 unly to September 1963. RECORDS VAILABLE.—Chemical analyses: 1 unly to September 1963. REMERS.—While reported for acidity are potential free and determined to pH 7.0. Daily samples were collected at this station and records of specific conductance for each 10-day period and on the maximum and minimum daily specific conductance for each month.
LOCATION,At intake line to C5 mises downstream from DAINAGE ARRA,3.16 square RECORDS AVALIDALEChemical Water temperatures: July REMARSValues reported for ance of daily samples are and on the maximum and mi

	Organics Phe- Alkyl	or as zene C6Hs sulfo- OH nate		0.0	2.	1	1	τ.	.2	!	1		.2	.2	1	;
				6.5	7.1	6.9	6.7	6.7	7.2	6.7	80		6.3	6.7	6.4	6.5
ŀ	i ii	o- pH	-	522 6	534 7	563 6	485 6	503 6	522 7	548 6	459 6		548 6	556 6	9 929	498 6
	Specific	ance (micro- mhos at 25°C)			ıo	ıc					4		īŪ	ıo	ıO	
	Acid	H + I		0.0	۰.	T	•	0	•	•	o.		۰.	ō.	°.	°.
	Hardness as CaCO3	Non- car- bon- ate		1	1	147	131		-	157	115		1	1	164	125
	Hardness as CaCO3	Cal- cium, mag- nesium		1	1	195	172	1	1	193	171		1	1	203	181
	solved			1	1	359	306	1	T	330	268		I I	I	360	312
63	phos-Dissolved	us (residue as at 180°C PO.		0.18	.18	_	-	. 25	.24	-	-		.58	23		- 1
r 19				; ;	· 1			-	· 1	0.6	8.5		·  -	<u>.</u>		-
tempe	Fluo-Ni-	(NO <sub>3</sub> )	_			14	10			6	жò				14	7
Sep																
July to September 1963	:	(C1)		!	ł	39	31	ł	1	33	25		!	ļ	40	32
1111on,	:	(SO.)		191	160	150	130	134	148	162	118		164	150	162	126
per m	. B	§ # §														
arts		bon- ate (HCO <sub>3</sub> )		1	1	58	20	1		44	68		1	1	48	89
in	Po-	Sium (K)														
Chemical analyses, in parts per million,	:	(Na)														
ical a	Mag-	stum (Mg)		1	1	11	6.7	1	1	13	10		1	I	13	10
Chem	Cal-	cium (Ca)		;	-	09	53	1	1	56	52		1		09	99
	Man-	ga- nese (Mn)		0.00	8.	1	1	.64	.21	.36	. 85		.13	.18	.20	.17
Ì		(Fe)														
	Alu-	num (Al)														
		(SiO <sub>2</sub> ) num				_										
	Mean	96		856	1010	1060	925	813	913	813	867		918	1440	999	855
	Date	5	July 10, 1963 (maximum	7/1-10)	7/11-20)	monthly)	monthly)	Aug. 10 (maximum 8/1-10)	Aug. 19 (maximum 8/11-20)	Aug. 2' (maximum monthly)	Aug. / (minimum monthly)	Sept. 8 (maximum	9/1-10)	9/11-20)	Sept. 23(maximum monthly)	Sept. I'(minimum monthly)

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

	Aver-	age	80 77 72
		31	1188
		30	83 78 67
		29	84 76 67
		78	84 74 70
		27	74
		26	80 82 74 68 67
		25	89
		24	80 74 70
		23	80 80 74 74 70 70
1963		22	82 81 72 76 71 71
er 1		21	
emb.		20	81 74 71
Sept		19	78 81 77 74 71 71
Temperature (°F) of water, July to September 1963		18	87 78 70
uly		41	77 75
٦,	Day	16	76 77 76 77 73 70
ateı		15	
of w		14	77 77 80 78 73
F)		13	77 80 
్		12	75 80 75
tur		=	75 80 74
pera		2	77 77 78 79 75 75
Temj		6	77 78 75
		œ	82 82 78 77 73 75
		^	82 78 73
		9	81 1- 76
		3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	81 80 75
		4	82 80 75
			86 80 75
		7	84 81 76
		-	832
	, the same of the	Monul	JulyAugust

#### 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, and O.6 mile downstream from Little Beaver Creek.

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

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

Water temperatures: July to September 1966.

Water temperatures: July to September 1966.

REMARKE.--Values reported for actidity are potential if free and determined to pH 7.0. Daily samples were collected at this station and records of specific con-ductance for each week or daily samples are available in district office at Columbus, Ohio. Analyses were made on the maximum daily specific conductance for each week or 10-day period and on the maximum and minimum specific conductance for each month. No discharge records available.

	Organics Phe- Alkyl	Col-nois ben- or as zene Cehs sulfo- OH nate	0.2	ι.	۲.	!	1	٦.	۲.	1	1	г.		1	١
-		<u> </u>	-												$\dashv$
		면. 면.	.9	6.9	6,5	5.4	6.1	9.9	8.	4.5	6.7	4.	6.0	9.	5.2
		ance micro- nhos at 25°C)	429		454	512	378	535	622	662	491	544	531	601	490
	<i>32</i> 5	fty (	!	1	1	T	T	1	1	0.2	٥.	- 1		v.	ō.
	Hardness as CaCO,	Non- car- bon- ate	1	1	1	162	116	- 1	T	208	151		T	188	150
	Haro as C	Cal- cium, mag- nesium	-	!	!	167	126	}	1	208	157	1	1	191	153
	Phos-Dissolved	us (residue as at 180°C) Po.	1	1	1	338	231	T	1	430	318	1	-	389	316
1963	Phos-I	us as PO.	0.14	60.	01.	-	1	60.	.07	-	-	.18	.12	-	1
ешрег	ż	(NO <sub>3</sub> )	1	ł	1	9.2	6.1	ł	ŀ	7.4	8.2	- 1	!	7.6	8.0
Sept	Fluo-	ride (F)													
Chemical analyses, in parts per million, July to September 1963	:	(CI)	l	1	}	26	20	1	ł	25	26	ł	1	28	23
m11110n	;	(SO <sub>4</sub> )	144	156	156	182	122	182	232	250	170	197	178	224	176
per		g at 6				9				_	- 00				4
parts	Bi-		1	!	1		12	- 1	1			 	1	4.	4
1	Po-	sium (K)													
analyses	;	(Na)													
mical		ne- sium (Mg)	1	1	+	12	8.6	!	1	16	11	1	-	13	10
Chem	Cal-		1	1	1	47	36	1	1	22	45	1	1	22	45
	Man-	ga- nese (Mn)	ı	1	1	1	1	0.64	1.6	1.9	.70	.62	.82	1.2	.67
		(Fe)													
	Silica mi- (SiO <sub>2</sub> ) mum (A1)														
		Silica (SiO <sub>2</sub> )													
	Mean	25													
	Date	ű	July 6, 1963 (maximum	July 9 (maximum weekly)	July 20 (maximum weekly)	July 23 (maximum monthly)	July 1 (minimum monthly)	Aug. 9 (maximum 8/1-10)	Aug. 19 (maximum 8/11-20)	Aug. 27 (maximum monthly)	Aug. 5 (minimum monthly)	Sept. 11 (maximum 9/11-20)	9/21-30)	monthly)	Monthly)

OHIO RIVER MAIN STEM -- Continued

3-1096. OHIO RIVER AT EAST LIVERPOOL, OHIO--Continued

	Aver-	age	80 79 75
		31	83 77
		30	78 70
		29	81 72
		28	82  72
		27	77 78 72
		26	81 76 68
		25	192
		24	121
		23	82 76 74
1963		22	82 76 75
		21	79
empe		20 21	79
ept		16	79 79 78 76 76
water, July to September		14 15 16 17 18	79 77 75
1.1y		17	79 78 75
ξ,	Day	16	78 78 76
ter		15	77 79 76
f wa		14	78 81 76
of of		13	78 82
֪֖֡		11 12	79 80 79
ture		Ξ	79 80 78
Temperature ('F)		10	79 80 78
		6	80 80 80 80 77 78
		8	82 80 77
			80  76
		4 5 6 7	79 80 76
		5	83 81 78
		4	 81 78
		ო	182
		2	81 77
		-	82  77
	Ment	MOIIIII	July

### OHIO RIVER MAIN STEM -- Continued

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

LOCATION, --About 600 feet upstream from dam (mile 54.3), 0.2 mile upstream from Stratton, Jefferson County, and about 1.1 miles downstream from Goose Run. DRAINAGE AREA . - - 23,866 square miles.

RECORDS AVAILABLE., "Chemical analyses: January 1961 to June 1963 (discontinued).

Water temperatures: January 1961 to June 1963 (discontinued).

Water temperatures: January 1961 to June 1963 (Ascontinued).

Rardness: Maximum, 190 ppm Oct. 1-31; Juniamum, 49 ppm Mar. 1-31.

Rardness: Maximum, 190 ppm Oct. 1-33; Juniamum, 49 ppm Mar. 1-31.

Specific conductance: Maximum, 77° June 28; Antinum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 192 ppm Sept. 1-30, 1962; Maximum, 422 ppm Sept. 1-30, 1962; Maximum, 821, 1961.

Rardness: Maximum, 192 ppm Sept. 1-30, 1962; Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 192 ppm Sept. 1-30, 1962; Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 193 ppm Sept. 1-30, 1962; Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 193 ppm Sept. 1-30, 1962; Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 193 ppm Sept. 1-30, 1962; Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

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Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Mar. 1-31, 1961.

Rardness: Maximum, 80 ppm Maximum, 80 ppm Max. 1-31, 1961.

Rardness: Maximum, 80 ppm Maximum, 80 ppm Maximum, 80 ppm

January 1963.
REMARKS.-Values reported for acidity are potential free and determined to pH 7.0. Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

		or col-		
		Hd		1
Specific	conduct-	ance (micro- mhos at	259 320 320 291 352 249 251 353 353	341
	Ac 1d-	1ty (H <sup>4</sup> 1)		
Hardness	3CO3	Non- arbon- ate	186 91 92 92 90 113 76 74 109	104
Hard	as CaCO,	cium, c	190 104 104 102 96 118 84 85 116	111
	Dissolved	solids (residue at 180°C)	403 204 204 185 228 228 153 146 200	216
200	ž	trate (NO <sub>3</sub> )	6.0000 8284 0.000 811	6.4
T office		ride (F)	4 4 4 1 0 4 0 6 6 6 6 6	0.2
Chemical analyses, in parts bet million, octobr 1902 to one 1905		Chloride (C1)	30 18 18 17 21 21 14 11 16	1.8
n, oc ton		Sulfate (SO <sub>4</sub> )	222 105 101 92 116 82 81 121	115
1111	Bioon	bonate (HCO <sub>3</sub> )	21 21 8 8 0 1 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10
and a	Pot-	tas- sium (K)		
, Ti (0		Sodium (Na)		
ana ry se	Mag-	ne- sium (Mg)		
emica.	5	cium (Ca)		
	Man-	ga- nese (Mn)	1.4 .05 .05 .31 .24 .42 .06	0.41
		Iron (Fe)	0.16 .399 .44. 1.6 .66 .433	0.56
		inum (A1)		
		Silica (SiO <sub>2</sub> )		
	1000	discharge (cfs)		
		Date of collection	Oct. 1-31,1962 Nov. 1-30 Dec. 1-31,1963 Jan. 1-31,1963 Jan. 1-31,1963 Mar. 1-31 May. 1-30 May. 1-31 May. 1-31 May. 1-31 May. 1-31 May. 1-31 May. 1-31 May. 1-31 May. 1-31 May. 1-31	Time-weighted

	1							
			731 4 9	•		9	:	8.4
						525 6 2		0.1 629 4.8
			¦			į		0.1
			238			346 166 162	1	
=			238			166	1	1
monthly p			488					Ī
ատալ			12	!		7.2	:	1
and min		_	0.6 12	:		30 4 7.2	:	1
nalyses based on maximum monthly, minimum monthly specific conductance, and minimum monthly pH			34	1		30	:	!
cific con			286			1.88	!	1
thly spe			0			ıc		!
num mon	L	_						_
, mini								
monthl		_						
maximum								
ed on			1			1		0.22 2.1
lyses bas			1			1		0.22
Ana	_	_	_					
	_	_	_					
	1962	aximum con-	uctance)		ntnimum con-	(a)	mini-	
	Oct. 3, 1962	(пахіп	ductan	Oct. 31	(mtnim	ductan	Oct. 9 (mini-	Hd unu

9.9	6.2	6.3	6.3	6.2	6.3	2.1	6.4	2.1	6.2	6.5	5.2	6.1	6.9	6.1
534	229	483	382	242	378	370	256	370	385	303	344	417	166	408
1	ļ	0.	1	1	٠.	1	1	1.2	1	1	0.1	1	ī	۰.
161	92	1	112	74	1	100	77	1	124	94	I	121	52	1
166	85	1	117	80	}	100	87	!	126	100	1	127	09	-
342	144	1	254	160	1	238	172	I	252	193	1	255	96	1
6.7	3.4	1	5.2	3,8	1	4.	4.5	1	6.5	4.3	1	6.1	2.4	-
e.*	0.	ł	α.	0.	1	e,	0.	1	0.3	.2	-	.2	0.	1
31	11	1	24	12	!	18	16	1	27	20	l	30	8.0	1
184	78	1	129	79	;	142	92	1	128	16	t t	137	25	1
7	7	1	9	80	ŀ	0	12	1	41		1	<b>x</b> o	10	!
		.61	!	1	98.	1		60.		1	0.14	ł	1	.27
ł	!	.14	1	1	1.8	1	1	8.	l	1	2.3	ı	-	1.5

Nov. 1, 1962 (maximum conductance) Nov. 26 (minimum conductance) ductance) mum pH)	cc. 25-26 (maximum conductance) cc. I (minimum conductance) ductance) cc. 24 (minimum pH)	(maximum conductance) in. 19 (minimum conductance) in. 30 (minimum conductance) in. 3 (minimum conductance)	(maximum conductance)  6b. 18 (minimum conductance)  6 ductance)  9 (minimum conductance)	(maximum conductance) ar. 31 (minimum conductance) ar. 5 (minimum conductance)
Nov. (E) (D) (D) (D) (D) (D) (D) (D)	Dec.	Jan. (m) du Jan. (n) Jan.	Feb. (n Feb. (a Feb.	Mar. Mar.

OHIO RIVER MAIN STEM -- Continued

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

Analyses based on maximum monthly, minimum monthly specific conductance, and minimum monthly pH

28082		Col- or											
		hф		9.9	6.4	6.3		6.5	6.4	5.5	6.0	6.3	5.5
	Specific conduct-	Non- 1ty carbon- (H <sup>+</sup> 1) (micro- mhos at ate 25°C)		330	169	284		422	278	353	409	249	328
		111 111 (H <sup>†</sup> 1)		1	-	0.0		1	1	Τ.	- 1	I	0.2
		Non- arbon		100	49	1		124	82	1	129	75	ŀ
	Hardness as CaCO,	Cal- cium, magne- sium		116	58	ļ		132	92	!	134	82	1
_	Dissolved	solids Cal- (residue cium, cat 180°C) magne- sium		195	94	1		242	174	1	268	138	1
tinued		trate (NO <sub>3</sub> )		3.7	2.4	1		4.0	2.9	1	5.2	3.6	1
33Cor	į	ride (F)		4.0		!		4.	ε.	1	0.4	e.	1
Chemical analyses, in parts per million, October 1962 to June 1963 Continued		Chloride (C1)		14	5.0	1		18	10	1	50	11	-
er 1962 t		Sulfate (SO <sub>4</sub> )		112	20	ļ		143	92	;	144	90	1
, Octob	i	bonate (HCO <sub>3</sub> )		20	Ħ	ŀ		10	12	1	9	12	1
1111on	Pot-	tas- sium (K)											
rts per		Sodium (Na)											
, in pa	Mag-	ne - sium (Mg)											
nalyses		cium (Ca)											
ical a	Man-	ga- nese (Mn)		1	1	0.29		1	1	.64	1	1	0,51
Chen		Iron (Fe)		ł	1	0.94		1	1	.35	1	1	0.20
	1	inum (A1)											
		Silica (SiO <sub>2</sub> )											
		mean discharge (cfs)											
	í	Date of collection	Apr. 22, 1963	ductance)	ductance)	mum pH)	May 23	ductance)	conductance).	mun pH)	June 5, (maximum conductance)	ductance)	mum pH)

OHIO RIVER MAIN STEM---Continued

OHIO RIVER AT NEW CUMBERLAND DAM, AT STRATTON, OHIO--Continued

	ė				
	Aver-	age	65 51 39	36 41	54 73 73
		31	35	4 1 35	161
		30	3.5 3.5 3.5	4 1 35	969
		29	5.5 2.5 3.5 5.5	35 35	54
		8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	8 4 E		55 68 77
		27	61 46 32	34 35 35 45 46	55 67 76
		26	6.2 4.7 3.8	35 44 44	56 55 68 75 76
		25	4.8 3.7	35	56 55 68 75 76
		24	0 4 6 7 8 8	36 34 40 40	57
		23	38	36 40	58 67 74
196		22	66 51 38	33 4 2 2 3	59 59 68 67 72 74
Temperature (°F) of water, October 1962 to June 1963 (Once-daily measurement, usually at 1000)		21	68 66 50 51 36 38	36 36	59 59 68 67 72 74
100		20	67 49 37	37 34 44	55 56 66 66 72 72
62 t		19	67 67 50 49 37 37	38 37 35 34 45 44	55 56 66 66 72 72
rature (°F) of water, October 1962 to Jun (Once-daily measurement, usually at 1000)		18	68 66 50 50 37 37	38 38 35 35 44 44	53 54 67 67 71 71
oper		17	68 50 37	3 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	53 67 71
Oct.	Day	16	39 39 39	39 38 35 35 42 42	52 52 66 67 71 71
er, emei		15	0.0 0.0 0.0	39 42	52 66 71
wat Lsur		14	62 68 52 51 38 36	37 39 35 35 41 42	52 51 66 66 73 72
of		13	62 68 52 51 38 36	37 39 35 35 41 42	52 66 73
(°F)		12	66 67 52 52 42 40	38 39 36 35 39 40	53 52 51 52 63 65 68 66 76 75 75 74
re e-da		Ξ			51 68 75
onc (Onc		0_	66 62 52 53 43 42	38 36 36 36 38 38	53 52 63 65 76 75
mpe.		٥	66 52 43	3.6 3.6	53 76
Te		ω	9 6 6 6 8 8	35 37 37 35 37 38	54 53 60 61 72 73
		4 5 6 7	67 52 44	35 37 37	54 60 72
		9	0 0 4 0 0 4	35 35 35 37 39 38	53 73
		5	53	35	53 53 59 60 72 73
		4	68 68 59 55 45 45	32 32 35 35 37 38	
		ю	68 59 45	32 32 35 35 37 38	53 53 56 57 74 72
		2		32 32 34 37 35 37	51 55 71
		-	67 58 45	3.2 3.5 3.5	52 55 72
	4	Month	October 67 67 November 58 56 December 45 46	January 32 32 February 34 37 March 35 37	April 52 51 53 53 May 55 55 56 57 June 72 71 74 72

### MUSKINGUM RIVER BASIN

# 3-1290. TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO

JOCATION. --At gaging station at highway bridge, 0.8 mile south of Newcomerstown, Tuscarawas County, 2 miles upstream from Buckhorn Creek, and 4 miles downstream from Dunlap Creek. DRAINAGE AREA.--2,436 square miles.

AECORDS AVAILABLE.—Chemical analyses: July 1946 to September 1948, October 1955 to September 1959, October 1960 to September 1963. Chloride: July 1946 to May 1949, October 1957 to September 1963. Rardness: October 1957 to September 1960.

Specific conductance: July 1946 to September 1948 (october 1955 to September 1963).

\*\*Reter temperature: Any 1949 of october 1955 to September 1953 (october 1955 to September 1953).

\*\*Reter temperature: Assument and the september 1955 to September 1955 to September 1955 (october 1955).

\*\*RETERMES 1956-63 --Specific conductance: Maximum daily, 4,400 micrombos Oct. 20, 1955 (oct. 20, 1955).

\*\*RETERMES 1956-60: Dissolved solids (1955-57): Maximum 1955 (oct. 20, 1955) (oct. 20, 1955).

\*\*RETERMES 1956-60: Dissolved solids (1955-57): Maximum 1957 (oct. 20, 1959).

\*\*RETERMES (1956-60: Dissolved solids (1955-57): Maximum 1957.

\*\*RETERMES (1956-60: Dissolved solids (1955-57): Maximum 1957.

\*\*RETERMES (1956-60: Dissolved solids (1957-60: Diss

River basin. Flow regulated by 8 flood-control reservoirs.

ı	اچ	pa	๓๓๓	101	0.1011-		اہے. ۔ ۔
	Oxygen	od fill-	13 M M	8	0   0   0		1 1 4
		Fil-	5 3	111	7   8   7		1   1   1
		<u> </u>	K # 0				
		Hd	6.7 7.4 7.0	7.5	1212		8.9
	Specific conduct-	ance (micro- mhos at 25°C)	3900 1660 2730	1620	1060		34
	Hardness as CaCO,	Non- car- bon- ate	1040 419 658	403	219		2
		Cal- cium, mag- nesium	1100 501 756	580	340	, , -	9 80
1963	_ ^	solids (residue at 180°C)	2540 1070 1720	1110	732		16
mber	-soud	us as PO.	0.21	1=1	2   2   E	18. 119.	
Septe	ž	trate (NO <sub>3</sub> )	10 7.6 12	9.7	6.6	80.1	1 9.6
2 to	Š	ride (F)	1.6	1.0	15:15:10	6.1 6.4.1	
water year October 1962 to September 1963		Chloride (C1)	1090 379 675	355	190	320 578	602 910
year o		Sulfate (SO.)	252 169 230	180	149	168	210 226 
ater	Carrier Ca	g at o					
		bon- ate (HCO <sub>3</sub> )	76 100 120	4 1 8	141818	891	1000
mi11	± + + + + + + + + + + + + + + + + + + +	E (L)					
s per	Po-	tas- sium (K)	9.5 6.1 8.5	111	111111		1 111
Chemical analyses, in parts per million,		Sodium (Na)	347 131 255	111	111111	11 111	1 111
yses,	Mag-	sium (Mg)	35 18 26	111	111111		1 111
l anal		ctum (Ca)	384 171 260	111			1 111
emics	Man-	ga- nese (Mn)	0.18 .49	1.65	2.1	10: 118:	114
ਈ		Iron (Fe)	0.51	.27	8 19 18		18.
	Alu-	mi- num (Al)					
		Silica (SiO <sub>2</sub> )	9.6 6.2 5.0	111	111111		1 111
		discharge (cfs)	487 881 698	997 1500 900	800 10810 11700 3658 4840		
	Şte	of collection	Oct. 3, 1962. Nov. 1 Dec. 20	Jan. 1-31, 1963 Jan. 16 Feb. 1-22	Feb. 19 Mar. 6-31 Apr. 20 Apr. 1-30 May. 1-31	May 22 June 1-30 July 1-31	Aug. 1-18, 26-31 Sept. 1-30 Sept. 12

MUSKINGUM RIVER BASIN--Continued

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

Chemical analysis.

Chemical analysis of the parts per million of Annalysis of September 1965

Advanced in a chimum anouthly smoothly smoothly conductance and marketine morthly thirbidity.

	E I	bid- ity		1	1	450		<b>!</b>	1	9		1	1	330		!	1	400		1	1	7		1	1
		Hd		7.7	7.6	1	t	-	7.3	1		7.4	6.9	1	t	?	7.2	1		7.9	7.4	1		6.9	6.7
	Specific conduct-	ance (micro- mhos at 25°C)		2660	748	!	0,000	3040	1340	ŀ		1230	230	1	000	1300	099	1		1740	1080	1		2310	739
	Hardness as CaCO,	Calcium, Non- magne-carbon- sium ate		645	203	ł	i i	3	319	ł		319	99	1	0	000	174	1		433	270	1		568	197
(A)		Calcium, magne- sium		742	254	!	9	040	381	!		354	92	1	700	450	226	1		218	346	1		639	246
TO COLD	Dissolved	(residue at 180°C)		1820	466	1	0.40	04.07	952	1		828	146	1	040	0.50	418	!		1280	100	1		1520	456
HOHE	Ni-	trate (NO <sub>3</sub> )		14	7.0	1	;	1	9.5	1		4.0	4.7	1	0	:	4.9	1		4.8	5,5	-		0.9	5.2
THE X THE	Fluo-	ride (F)		1.2	e.	1		7:	φ.	1		۲.	۰.	ŀ	t	:	4.	1		o.	α.	1		1.4	ı.
(Analyses oased on maximum and minimum monthly specific conductance, and maximum monthly turbitly	0110	(C1)		099	102	1	G	000	288	1		298	14	l	096	700	95	1		380	182	1		565	118
conduct	ofoto	(30,		204	139	1	9	809	142	1		96	64	1	ē	161	114	1		194	167	1		144	116
pecific	Bicar-	bonate (HCO <sub>3</sub> )		118	62	1	0	0	92	1		42	12	ŀ	0	0	64	1		104	6	1		98	09
a cura	Po-	Sium (K)																							
OH HIDWITH	1	(Na)																							
a pure	Mag-	ne- sium (Mg)																							
	Cal-	clum (Ca)																							
ממת חוו		(Fe)																							
Ro Sass	21150	(SiO <sub>2</sub> )																							
(Anal.	Mean	discharge (cfs)		200	1800	3000	0	000	1100	009		10400	11300	11700	0181	2101	0006	5240		1060	1700	096		684	3670
		Date of collection	Jan. 31, 1963 (maxi-	num conductance)	conductance)	turbidity)	Feb. 5 (maximum	Toh 11 (minimum	conductance)	reb. Ib (maximum turbidity)	Mar. 21 (maximum	conductance)	conductance)	turbidity)	Apr. 18 (maximum	Apr. 1 (minimum	conductance)	turbidity)	May 15 (maximum	conductance)	conductance)	turbidity)	Time 28 (maximim	conductance)	conductance)

MUSKINGUM RIVER BASIN--Continued

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

5-1250. IUSCARAWAS KIVER AT NEWCOMERSIOWN, OHIO---COntinued

	Tur-	bid- ity	1	ŀ	1	ŧ	;	١
		띺	7.2	6.9	6.9	7.1	6.5	6.4
	Specific conduct-		2850 7.2	1750	3170	1750 7.1	4360	2630 6.4
<b>q</b> )	Hardness as CaCOs	Non- carbon- ate	683	418	762	399	940	582
ontinue		Calcium, magne - sium	770	474	836	496	1030	672
ned oidityC	Dissolved	~ a	1820	1070	2030	1070	3020	1870
ontinuly turk	Äi-	trate (NO <sub>3</sub> )	11	7.2	9.4	7.0	17	1.2 7.8
1963C month1	Fluo-	ride (F)	1.8	6.	1.8	1.4	2.6	1.2
Chemical analyses, in parts per million, January to September 1963Continued maximum and minimum monthly specific conductance, and maximum monthly turbid	Chlorido.	(C1)	720	390	820	360	1220	640
nuary to Stance, an	o de la constante de la consta	(30,	234	163	223	206	236	216
on, Jan	Bicar-	bonate (HCO <sub>3</sub> )	106	89	06	118	110	110
milli ecific	Po-	Sium (K)						
parts per conthly sp	ani poo	(Na)						
ses, in Inimum	Мад-	sium (Mg)						
analys and mi	Cal-	cium (Ca)						
hemica] maximu	100	(Fe)						
no pag	11.0	(SiO <sub>2</sub> )						
Chemical analyses, in parts per million, January to September 1963Continued (Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidityContinued)	Mean	discharge (cfs)	628	748	494	480	487	310
<b>v</b> )		Date of collection	July 18, 1963 (maxi- mum conductance)	conductance)	Aug. 15 (maximum conductance)	conductance)	Sept. 15 (maximum conductance)	conductance)

MUSKINGUM RIVER BASIN--Continued

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

		Threshold odor	<b>M-</b> 2	H-4	0	8-5 -2	0	<b>K</b> -2	0	E-2	0	•	M-2
Continued		Turbid- ity	7	10	10	10	10	09	55	15	1	1	-
oer 1963(		Cyanide (CN)											
to Septem		Nitrite (NO <sub>2</sub> )											
tober 1962	Ammonta	nitrogen as NH4											
ter year Oc	Organics	Alkyl benzene sulfonate (ABS)	0.3	۲.	е.	•	2.	٥.	0.	0.	۲.	.2	.3
111on, wa	Orga	Phenols as Caugon											
rts per mi	oxygen	Percent satu- ration	58	78	84	20	53	20	75	120	143	115	911
ses, in pa	Dissolved oxygen	Parts per million	5.7	9.3	11.9	10.2	7.6	0.6	8.1	11.6	11,3	9.4	10.0
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued		Date of collection	Oct. 3, 1962	Nov. 1	Dec. 20,	Jan. 16, 1963	Feb. 19	Mar. 20	Apr. 23	May 22	July 2	July 30	Sept. 12

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

Chloride, in parts per million, and specific conductance, water year October 1962 to September 1963

	Octol	her	Nove	ther	Decen		Janu	10 TV
		Specific	2,5761	Specific	Decen	Specific	Janu	Specific
Day	Chlo- ride (Cl)	conduct- ance (micro- mhos at 25°C)	Chlo- ride (Cl)	conduct- ance (micro- mhos at 25°C)	Chlo- ride (Cl)	conduct- ance (micro- mhos at 25°C)	Chlo- ride (C1)	conduct- ance (micro- mhos at 25°C)
1 2 3 4 5	975 1000 1050 1100 1220	3630 3700 3900 3900 4490	360 420 390 400 350	1660 1820 1730 1780 1630	570 640 790 780 660	2430 2620 3090 3090 2700	432 510 420 460 490	1940 2190 1900 2020 2080
6 7 8 9 10	625 550 650 1100 850	2640 2410 2580 3940 3290	420 340 240 270 270	1800 1600 1280 1350 1430	720 680 680 570 460	2920 2720 2740 2470 2070	500 460 470 500 420	2170 2030 2080 2150 1950
11 12 13 14 15	850 700 625 575 650	3230 2720 2600 2380 2620	344 430 120 108 155	1620 1790 876 790 950	500 500 440 560 780	2160 2170 2060 2380 3020	340 220 200 178 102	1600 1190 1100 963 748
16 17 18 19 20	825 550 650 400 385	3090 2320 2550 1810 1720	240 230 290 290 300	1180 1180 1400 1440 1440	740 840 720 740 680	2940 3170 2900 2920 2700	106 141 150 240 230	787 916 970 1240 1250
21 22 23 24 25	390 470 430 340 292	1740 1980 1880 1590 1440	340 460 420 386 440	1590 1960 1880 1780 1940	560 530 460 370 290	2350 2210 1980 1720 1440	260 260 320 340 340	1340 1340 1530 1630 1630
26 27 28 29 30 31	312 335 355 332 348 385	1510 1580 1630 1580 1620 1720	460 520 520 500 530	1970 2190 2170 2160 2230	280 340 350 380 480 400	1370 1580 1640 1740 2050 1810	290 360 470 530 540 660	1480 1710 2030 2280 2290 2660
	Febru	ary	Mar	ch	Apr	11	Ma	у
1 2 3 4 5	640 620 640 660 800	2580 2530 2570 2570 3040		  	95 89 114 122 157	660 665 755 802 935	192 335 200 280 265	1100 1500 1130 1360 1330
6 7 8 9	600 550 380 400 400	2410 2180 1690 1730 1720	14 175 174 227 235	230 776 803 953 989	143 149 212 198 190	887 918 1120 1100 1090	182 218 210 238 255	1080 1180 1170 1280 1320
11 12 13 14 15	288 280 360 370 380	1340 1340 1570 1660 1710	198 291 294 227 188	881 1180 1190 1010 868	210 255 225 240 205	1150 1280 1220 1290 1150	258 298 280 280 380	1360 1480 1440 1440 1740
16 17 18 19 20	440 540 540 580 580	1940 2230 2230 2370 2370	222 198 190 195 112	968 914 894 919 649	232 238 260 225 85	1240 1260 1360 1240 664	268 252 288 375 335	1410 1370 1500 1740 1640
21 22 23 24 25	540 600  	2250 2370  	298 220 235 170 170	1230 1000 1030 883 868	175 182 265 150 170	921 940 1180 866 938	328 318 320 305 320	1630 1570 1570 1510 1580
26 27 28 29 30 31	   	=======================================	135 112 140 125 145 92	779 688 786 735 637 629	225 240 210 200 210 	1140 1210 1120 1090 1140	302 302 360 440 335 335	1530 1540 1720 1960 1690 1690

### OHIO RIVER BASIN

### MUSKINGUM RIVER BASIN--Continued 3-1290. TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO--Continued

Chloride, in parts per million, and specific conductance, water year October 1962 to September 1963--Continued

	June Specific		Ju	ly	Augu	ıst	Septer	nber
Day	Chlo- ride (Cl)	Specific conduct- ance (micro- mhos at 25°C)	Chlo- ride (C1)	Specific conduct- ance (micro- mhos at 25°C)	Chlo- ride (C1)	Specific conduct- ance (micro- mhos at 25°C)	Chlo- ride (Cl)	Specific conduct- ance (micro- mhos at 25°C)
1 2 3 4 5	355 525 520 400 185	1690 2190 2210 1820 1040	425 390 450 635 560	1880 1750 1930 2500 2340	680 420 590 660 580	2700 1910 2370 2590 2380	680 680 660 640 660	2770 2770 2690 2630 2710
6 7 8 9	135 118 182 270 220	819 739 970 1260 1170	520 540 560 580 580	2170 2250 2340 2420 2420	480 460 360 370 510	2160 2000 1750 1820 2170	710 800 800 800 840	2840 3100 3100 3100 3180
11 12 13 14 15	135 180 130 195 185	848 1000 856 1070 1090	550 600 680 680 720	2340 2420 2640 2640 2740	540 540 560 590 850	2310 2310 2350 2420 3170	910 920 900 1100 1220	3390 3450 3450 3980 4360
16 17 18 19 20	185 290 300 345 270	1090 1420 1490 1630 1430	720 720 720 460 570	2810 2790 2850 2130 2320	800 760 800 	3090 2940 3070  	1100 800 750 950 1050	4020 3180 2930 3520 3850
21 22 23 24 25	325 315 305 410 415	1600 1580 1530 1830 1820	480 550 620 660 620	2150 2340 2500 2620 2520	  	   	1000 1100 950 760 760	3770 3980 3520 3050 2980
26 27 28 29 30 31	485 490 565 455 358	2060 2100 2310 2020 1670	700 660 600 460 370 440	2740 2640 2420 2020 1820 1980	640 640 560 680 760 700	2610 2640 2400 2700 2970 2830	820 925 1080 1100 1080	3160 3530 3980 3980 4020

MUSKINGUM RIVER BASIN--Continued

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

ı	ė	a.				-
	Ave	age	20.4.6 20.00	32	53 72	87 67 07
		33	32	32   4	121	821
		30	4.0 4.0 3.2	32	402	80 76 63
		59	48 41 32	32	56 68 76	78 76 62
		28	48	32	58 69 74	82 74 67
		27	440	32	8 2 2	83 75 67
		26	46 40 32	32	55 67 78	83 74 65
53		25	4 4 6 2 2 2	21.4	53	92
196		24	52 42 32	32	50 65 75	8 1 1 6 4
ber		23	322	213	51	79
pten		22	948	32	57 63 70	78
Se		21	946	22.64	666	61 3
of water, water year October 1962 to September 1963 (Once-daily measurement at 1800)		20	60 44 32	32 32 45	59 70	7   2
1800		19	3 4 6 2 2 2 2 2 2	33	60	80 77 72 70
ber at 1		18	63 46 32	33	59 66 72	82 75 72
oto		17	3 4 8 2 2	333	55	88 74 71
f water, water year October (Once-daily measurement at	Day	16 17	69 47 34	322	51 68 70	76 73 71
ye	_	15	37.78	3823	52	77 76 72 73 69 71
ater y me			47	32 38	2 1 20	73 73 69
iail		13 14	63 47 32	32	49 60 67	7.5
ate ce-c		12	67 47 32	32	63	77
or Con		=	47	32	48	75 78 75
F)		2	65 48 32	32 36	49 70 78	70 78 74
္		٥	48	32 32	50 71 76	74 70 77 78 72 74
ture		ω	47	32	50	77 80 72
Temperature (°F)		7	32	32	54 65 72	77
Temi		9	62 47 36	323	525	77 79 71
		5	62 47 38	322	6.0	78 79 71
		4	63 47 40	32	53	77 80 73
		е	61 47 39	32	54 22 72	78 77 78 80 74 73
		2	62 40 40	32	54 57 73	82
		-	61 47 40	32	52	81 78
	4	MOIIGH	October November December	January February March	April May	July August September

3-1390, KILLBUCK CREEK AT KILLBUCK, OHIO

LOCATION.—At Eaging station at bridge on U.S. Highway 62 at Killbuck, Holmes County, 0.12 mile downstream from Black Creek.

MECONDA VAILABLE.—Chemical analyses: October 1967 to September 1958.

We are temperatures: October 1967 to September 1963.

Settlement recorded: October 1967 to September 1963.

Settlement recorded: October 1967 to September 1963.

Settlement recorded: October 1967 to September 1963.

Settlement recorded: September 1968 to September 1963.

Settlement concentrations: Maximum daily, 2.177 pune 10; minimum daily, 1 ppm Dec. 14, 15, 17.

REMARKS: 1968 to Maximum daily, 2.177 ppm June 11; minimum daily, 10, 170 ppm June 11; minimum daily, 10, 170 ppm June 11; minimum daily, 15, 17.

REMARKS:—Flow affected by ice Dec. 6-19, Van. 4-6, V4-16, 20-21, Peb. 1-7, 10-18; 21-28, Max. 1-7.

ļ	۵	4				
	Aver-	age	42	93 40 40	51 58 67	4 6 6 9
		31	35	33  52	1091	121
		30	4 to to to to	33	56 63 72	72 70 56
		29	47 36 37	33	55 63 68	4 0 4 9 4 9 4 9
ı		28	45 35 35	32	52 61 70	74 64 64
		27 28	ପ୍ର ମ ପ୍ର ମ ପ୍ର ମ	E E 4	58	76 65 64
		26	000 000 000 000 000 000 000 000 000 00	34 51	4 9 5 6 7 9	76 68 64
2		25	44 33	33 44 50	4 50 8 5 50 8	73 69 60
<u>6</u>		24	340	32	54 54 66	44 66 60
mber		23	38	34 37	52 53	73 65 61
pte		5	340	32	5.89	74 70 61
Se		21	3.40	32 33	58 61 63	4 6 9 4 9 4 9 4 9 4 9 9 9 9 9 9 9 9 9 9
Č,		20	464	6 4 0 8 4 0	58 61 68	72 65 64
Temperature (°F) of water, water year October 1962 to September 1963		16	34 4 2	32 35 43	65	72 64 68
per		18	0.4 m	w w 4	56 65	73 64 68
Sct		17	5.0 4.8 3.4	6 8 4 6 8 8	51 60 65	68 66 67
ar	Day	15 16 17 18	60 61 42 46 33 33	332	59 66	69 69 69
r y		15	933	333	4 0.0 8 0.0	65
rate		14	56 32	332	46 60 68	65
		13	57 45 33	333	59 63	99 70 49
ate		11 12 13 14	66 44 32	999	46 45 59 59 70 65	65 72 70 73 69 68
		Ξ	47	333	46 70	65 40 69
£		10	1 8 3 2	34	45 66 77	6.8 6.5 6.5
ات		٥	46	0 0 0 4 0 5 4 0	51 65 71	62 73 71
1		00	32	41 34 34	64	66 72 70
per		7	41	37 34 34	51 57 69	7172
Tem		9	35	999	4 v 4 8 4	68 72 69
		5	146	33.4	649	67 72 66
		4	38	33.48	55.5	66 70 68
		ო	1 4 6	6 6 6 4 6	59 56 62	70 71 69
		2	164	3.5 3.2 3.2	649	73 74 74 70 65 66
		-	3.5	334	4 4 6 6 3	
	Month		October November December	January February March	April May June	July

### QUALITY OF SURFACE WATERS, 1963

### MUSKINGUM RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963

		OCTOBE	к		NOVEMBE	к		DECEMBER	
		Suspen	ded sediment		Suspen	ded sediment		Suspende	ed sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	62		E 8	50	14	1.9	63	8	1.4
3	50 61		E 4 E 10	49	17	2.2	60 58	7	1 • 1 2 • 0
4	136		E 50	48	17	2.2	58	6	• 9
5	103		E 35	51	17	2.3	60	3	• 5
6	75	83	17	52	13	1.8	84	9	2.0
7	62	67	11	52	11	1.5	94	25	6.3
8	70	63	12	52	16	2.2	80	3	• 6
9	71 67	61	12 11	54 393	31 210	4.5 A 220	70 <b>65</b>	6	1.0
10	01	00	"	373		7 220	0,5	1 1	1.00
11	60	61	9.9	636	109	187	60	4	• 6
12	54	64	9•3	421	72 71	82 53	60 60	3 2	• 9
13	51 48	66 63	9•1 8•2	275 185	53	26	60	1	• 2
15	46	64	7.9	139	38	14	65	ī	• 2
16	16	65	8.1	120	80	26	70	2	• 4
17	53	70	10	168	43	20	75	1	• 2
18	70	54	10	198	38	20	75	2	• 4
19	59	32	5.1	175	19	9 12	80 97	. 6	1.3
20	54	56	8.2	156	29			10	
21	50	58	7.8	138	27	10	110	10	3.0
22	47	27	3.4	123	28	9.3	116 118	10	3 • 1 2 • 9
23	46 47	24 16	3.0 2.0	105 91	7 3	2.0	98	11	2.9
25	48	13	1.7	81	ž	.4	105	10	2 • 8
26	51	14	1.9	76	2	.4	95	10	2.6
27	52	12	1.7	69	4	. 7	85	11	2.5
28	51	9	1.2	67	3	•5	92	7	1 • 7
29	50	24	3.2	65	8	,•7	92	6 8	1.5
30	50 51	14	1.9	64		1.4	116 112	8	2.4
Total	1841		284.8	4203		715.6	2533		51.0
		JANUAR	Y		FEBRUAR	Y i		MARCH	
1	101	6	1.6	50	8	0.4	70	В	1.5
2	91	] 3	.7	60	7	1.1	80	10	2.2
3	87 80	2	.5	80	5	1.1	120 500	11 30	3 • 6 40
5	80	3	.6	110	6	1.8	4300	176	2040
						1			2440
7	80 80	3 4	•6	150 330	11 50	4.4	3900 3500	253 153	2660 1440
8	<b>B</b> 0	4	.9	311	14	12	2870	193	1500
9	81	4	.9	212	8	4.6	2610	190	1340
10	89	7	1 • 7	160	6	2.6	2300	161	1000
11	257	58	S 50	130	4	1.4	2080	157	882
12	447	53	64	110	5	1.5	1840	170	844
13	302 220	17	14	90 80	6	1.4	1930 1940	163	849 786
15	180	17	8.3	75	8	1.6	1800	122	593
1				70	1 _			82	354
17	160 136	7 4	3.0 1.5	70 70	7 7	1.3 1.3	1600 1520	95	354 390
18	116	5	1.6	80	6	1.3	1470	65	258
19	107	4	1.2	154	10	4.2	1440	116	451
20	95	3	. 8	232	16	10	2090	468	2640
21	90 80	4	1.0	200 160	14	7.6 3.4	2000 1780	204 147	1100 706
23	75	3	•6	120	6	1.9	1480	90	360
24	70 70	3 6	1.1	100 85	8	2.2	1180 940	52 48	166 122
					1	,		1	
26	65	6	1.0	75	8	1.6	819	62	137
27	65 60	12	2.1	70 70	10	1.9 1.5	871 816	58 51	136 112
29	60	13	2.1			1.5	741	52	104
30	55	10	1.5				666	51	92
31	55	6	•9				602	53	86
			171.7	3509		121.9	49855		21195.3

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

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

Suspended sediment, water year October 1962 to September 1963--Continued

		APRIL			MAY			JUNE	
		Suspen	ded sediment		Suspen	ded sediment		Suspen	ded sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	566	50	76	336	36	33	113	50	15
2	555	44	66	311	35	29	100	53	14
3	524 682	128	85 236	289 269	43 50	34 36	92 94	55 57	14 14
5	640	50	86	244	47	31	94	86	22
		1							
600	602	39 29	63	225	34 36	21	345 166	1700	A 1600
7 8	531 471	32	42 41	211 197	40	21	127	167	57
9	426	22	25	183	36	18	113	123	38
10	382	17	18	175	39	18	151	213	S 101
11	343	11	10	203	48	26	505	2170	S 3150
12	313	10	8.4	194	27	14	289	300	234
13	288	13	10	175	32	15	211	150	85
15	264 243	18	13	167 153	31	14 11	161 126	138 129	60
19	243	°		195	"	-		12,	
16	224	4	2 • 4	142	22	8.4	106	83	24 24
17	227 296	3 23	1.8 18	139 140	27 34	10 13	95 86	92 76	18
19	338	63	s 75	133	45	16	74	75	15
20	966	242	S 618	135	30	11	68	70	13
21	877	41	97	139	38	14	66	70	12
22	710	61	117	130	32	ii	62	52	8 • 7
23	605	45	74	120	28	9.1	57	58	8.9
24	513	32	44	111	26 30	7 • 8 8 • 4	54 51	59 61	8 • 6
25	437	31	36	104	30	0.4	21	61	8 • 4
26	382	47	48	99	26	6.9	48	51	6 • 6
27	333	57	51	92	29	7.2	47	49	6.2
28	296 279	42 38	34 29	106 218	30 295	8•6 174	46	48 52	6.0
30	343	43	40	166	73	33	46	62	7.7
31				131	54	19			
Total	13656		2069.8	5437		698.4	3639		5698.5
		JULY			AUGUST			SEPTEMBE	R
1	50	66	8.9	54	132	19	30	42	3.4
2	50	63	8.5	51	116	16	28	40	3.0
3	45 42	52 56	6.3 6.4	49 117	127 410	17 S 140	28 27	56 57	4.2
5	39	52	5.5	65	76	13	28	47	3.6
	37	57	5.7	52	69	9.7	28	57	4.3
6 · ·	35	61	5.8	52 50	76	10	28	55	4.2
8	33	60	5.3	56	76	11	27	40	2 • 9
9	32	54	4.7	54	84	12	26	40	2 • 8
10	32	52	4.5	62	86	14	26	58	4.1
11	32	38	3.3	60	61	9.9	26	41	2 • 9
12	31 30	39	3.3	48	78	10	40	68	7 • 3
13	30	56 43	4.5	44	82 68	9•7 8•1	38 43	47 49	4 • 8 5 • 7
15	37	46	4.6	44	61	7.2	43	69	8.0
		1				_			_
16	43	74	8.6 5 209	41	67	7.4	40	59	6.4
17	128 60	516 153	5 209 25	40 39	53 63	5.7 6.6	32 30	56 69	4 • 8 5 • 6
19	44	83	9.9	38	52	5.3	28	58	4.4
20	44	101	12	59	87	14	28	51	3 • 8
21	43	87	10	58	39	6.1	29	49	3 • 8
22	41 41	89 93	9•8 10	49 43	60 86	7•9 10	28 27	38 30	2.9
24	48	87	11	40	78	8 • 4	26	34	2 • 4
25	46	99	12	38	44	4.5	26	38	2.7
26	40	88	9.5	36	56	5.4	27	45	3 • 3
27	35	72	6.8	33	61	5.4	27	43	3.1
28	43 48	85 82	9.9 11	32 31	74	6.4 3.8	27 26	33	2.4
30	62	91	15	31	56	4.7	27	24	1.7
31	61	78	13	32	48	4.1			
Total	1384		463.5	1490		412.3	894		117.0
					•				

MUSKINGUM RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: b. bottom withdrawal tuber; C. chemically dispersed; D. decanation; N. in native water; P. pipet; S. sieve; V. rjenal accumulation tube; W. in distilled water)

Method of analysis SBWC SBWC SBWC SBWC SBWC SBWC SBWC 2,000 0.016 0.031 0.062 0.125 0.250 0.500 1.000 Percent finer than size indicated, in millimeters 100 888 1881 Suspended sediment 98 100 98 98 100 100 100 8888888888888 87 88 83 83 97 97 97 84588388 0.008 0.004 128611887 0.002 82442468 Sediment discharge (tons per day) Sediment concen-tration (ppm) 200 200 775 474 8620 3620 1040 Discharge (cfs) 4620 2120 260 260 657 657 Water tem-per-ature (°F) Samp-ling point Time (24 hour) 1440 1440 0800 0830 0830 0830 Mar. 5, 1963 Mar. 5 Mar. 20 Mar. 29 June 11 Date of collection

# 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. DRAIMAGE AREA, --160 square miles.

RECORDS AVAILABLE. --Chemical analyses: June 1959 to July 1963.

REMARKS.,--Samples for iron and manganese filtered clear when collected. No discharge records available.

ļ	0	nor 10n										
	oxygen		0 68	4 66	5 73	2 71	99 9	8.984	8	0 49	1 60	
	Disso	<u> </u>	7	80	10.	10.	9.0	80	80	4	ů.	
		- co				2		(I)	LD.	(J)	w	
	0.1	pH t	3 7.4	7.8	2.6	8 6.9	7.2	3 7.3	2.4	8 7.4	2.	
	Specific conduct-	ance (micro- mhos at 25°C)	44	26	43	33	129	253	33	34	24	
	큠	ity as H <sup>+</sup> 1		_	_				_	_	_	
	Hardness as CaCO <sub>3</sub>	Non- car- bon-		_	-		31					
	Dissolved as C solids (residue cal- at 180°C) cium, mag-nesium						20					
53				356	270	199	82	154	198	200	140	
y 19	Phos.	phate (PO4)	.0 0.15									
o Jul	ž		1.0	9.	3.	3.4	2.5	9.	7.	1.8	1.2	İ
1962 t	F110	ride (F)	0.3	2	.2	2.	6.			~		
Chemical analyses, in parts per million, October 1962 to July 1963		Chloride (C1)	32	36	17	14	4.0	8.0	16	30	16	
nillion,		Sulfate (SO <sub>4</sub> )	87	139	111	72	33	63	99	21	27	
er		Se g		_	_	_			_	_	_	Į
arts p		bon- ate (HCO3	93	107	_		23				_	
tn p	Po-	tas- sium (K)	3.6	4.1	_		2,1			2.8		
alyses,		Sodium (Na)					3.0	5.9	11	17	10	
cal ar	Mag-	ne- sium (Mg)	13	17	23	11	3.6	7.8	6.6	9.2	7.8	
Chemi	[	clum (Ca)						29	37	32	55	
	Man-	ga- nese (Mn)	0.20	8	.04	.27	9.	.34	.28	.38	1.1	
		Iron (Fe)	0.71	77.	.34	.35	. 23	.49	.50	.71	.54	
	Alu-	mum (A1)										
		Silica (SiO <sub>2</sub> )	3.4	6.4	5.3	6.2	6.1	6.7	6.7	7.5	7.2	
		mean discharge (cfs)		_								
		of collection	Oct. 3, 1962.	Nov. 2	Dec. 20	Feb. 19, 1963	Mar. 21	Apr. 22	May 23	July 2	July 30	

### QUALITY OF SURFACE WATERS, 1963

### 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.

DRAINAGE AREA. --5,982 square miles.

RECORDS AVAILABLE. --Water temperatures: October 1952 to September 1960; 1961 to 1963 water years unpublished.

Sediment records: October 1952 to September 1963.

EXTREMES, 1962-63. --Sediment concentrations: Maximum daily, 874 ppm June 6; minimum daily, 3 ppm Jan. 26-29, Feb. 7-10.

Sediment loads: Maximum daily, 41,400 tons Mar. 5; minimum daily, 13 tons Jan. 29. Sept. 30.

EXTREMES, 1952-63. --Sediment concentrations: Maximum daily, 1,600 ppm Jan. 22, 1959; minimum daily, 1 ppm on several days during 1952, 1954, 1956, and 1960.

Sediment loads: Maximum daily, 160,000 tons Jan. 22, 1959; minimum daily, 3 tons on several days during 1952, 1954, 1956.

REMARKS.--Flow regulated by 14 flood-control reservoirs. Flow affected by ice Jan. 24, 25.

Suspended sediment, water year October 1962 to September 1963

		OCTOBER			NOVEMBE	R		DECEMBER		
		Suspende	d sediment		Suspen	ded sediment		Suspended sedimen		
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	
1	1250	18	61	1620	14	61	1500	8	32	
2	1110	18	54	1620	13	57	1400	7	26	
3	1030	17	47	1610	9	39	1380	5	19	
4	1290	15	52	1600	6	26	1340	5	18	
5	1520	14	57	1610	5	22	1340	6	22	
6	1370	13	48	1590	5	2.2	1480	6	24	
7	1310	13	46	1570	5	21	1660	7	31	
8	1270	12	41	1660	13	58	1740	7	33	
9	1360	12	44	1740	1.7	80	1770	7	3.3	
10	1340	11	40	3400	163	S 1770	1650	8	36	
11	1260	10	34	8320	324	7280	1490	8	32	
12	1180	10	32	9330	228	5740	1170	8	25	
13	1090	10	29	7850	163	3450	1200	7	23	
14	1020	10	28	5870	91	1440	1240	7	23	
15	962	11	28	4690	54	684	1340	7	25	
16	926	11	28	4120	43	478	1450	7	27	
17	1060	12	34	3770	42	428	1520	7	29	
18	1420	12	46	3970	39	418	1520	8	33	
19	1680	14	64	4170	33	372	1540	8	33	
20	1860	18	90	4020	13	141	1670	8	36	
21	1850	22	110	3650	6	59	1920	8	41	
22	1740	23	108	3200	7	60	2380	8	51	
23	1680	22	100	2820	7	53	2790	8	60	
24	1660	22	99	2510	7	47	2690	7	51	
25	1660	22	99	2230	7	42	2750	7	52	
26	1740	22	103	2020	8	44	2860	7	54	
27	1790	21	101	1880	8	41	2400	7	45	
28	1740	20	94	1780	8	38	2100	8	45	
29	1690	18	8.2	1710	9	42	2100	8	45	
30	1650	17	76	1600	9	39	2240	9	54	
31	1630	15	66				2440	10	66	
Total	44138		1941	97530		23052	56070		1124	

S Computed by subdividing day.

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

Suspended sediment, water year October 1962 to September 1963--Continued

		JANUARY	sediment, wat		FEBRUA			MARCH	
Ì		_	ided sediment	1		ded sediment	1		ided sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
2	2310 2270	11	69	1520 1560	4	16 17	1550 1900	9	38
3	2070	10	56	1840	4	20	2780	26	195
4	2000	9	49	2260	5	30	9700	251	10400
5	1830	А	40	2780	4	30	33800	454	41400
6	1800	8	39	3040	4	3.5	30900	420	35000
7	1760	7	33	3530	3	28	25300	450	30700
8	1720	7	3.2	4100	3	3.5	19800	274	14600
9	1720 1850	7 7	32	4200 3720	3	34 30	26500 29300	162	15700 12800
10	1000	; '	25	3720	,	, 30		102	12800
11	2780	52	5 439	3220	4	35	28700	142	11000
12	5950	144	2310	2870	5	39	, 58800	128	9990
13	821J 836J	112	2480 1490	2710 2570	6	44	9200 28900	121	9540 8740
15	7430	61	1220	2270	5	31	1 29200	103	8120
				1			ii		
16	6380	3.5	603	1930	5	25	28800	93	7230
17	5080 4260	22 17	. 302 196	1680 1580	5 7	23 30	29000 29400	112	8770 7060
19	4260 3740	14	141	1740	26	122	29400	85	7060 6540
20	3580	12	116	2040	12	66	28400	440	33700
		1		1		ì	ľ,		i
21	3140 2510	11	93 68	2510 2850	8	54	27000	154	11200
23	2230	, 8	48	2450	1 8	53	29500	73	5810
24	2000	, 6	32	2300	8	50	29300	60	4750
25	180∪	5	24	2140	8	46	29200	5.8	4570
26	1730	3	14	1870	8	40	28500	5.8	4460
27	1770	3	14	1620	8	35	28200	61	4640
28	1740	3	14	1540	8	3.3	28300	. 63	4810
29	1600	3	13				28100	68	>160
31	1540 1540	4	17 17				27700 27200	68 67	5086 4920
Total	96700		10097	68440	†	1102	782130		334689
		APRIL		†	MAY		1	JUNE	
1	26800	65	4700	5560	32	480	2160	15	87
2	26300	62	4400	5650	31	473	1890	14	71
3	25400	63	4320	5170	27	377	1710	13	60
4	2400J	59	3820	4740	24	i 307	1680	13	59
5	22600	6.2	3780	4330	2.5	269	5220	196	5 3910
6	19600	70	3700	3970	2.3	246	11400	874	26900
7	13300	103	3700	3700	2.3	300	11300	460	14000
8	9590	85	2200	3480	2.3	216	11100	360	10800
9	7850 6910	65 46	1380 858	3240 3050	22	192 165	10200 9500	325 275	8950 7050
11	6230	37	622	2870	18	139	10400	329	9240
12	5650	30	458	2930	17	134	12200	243	8000
13	5150 4490	26 24	362	2820	15 15	114	11200	169 110	5110 3000
15	4640	25	313	2620	15	106	9330	80	2020
16	4130	23	256	2460	16	106	i . 8840	6.5	1500
17	4010	22	238	2360	16	102	8420	57	1300
18	4150	19	213	2300	16	99	8120	47	1030
19	4840	28	366	2270	16	9.8	7070	48	916
20	10300	386	5 12800	2360	16	102	4420	36	430
21	15100	340	13901	2450	17	112	3430	32	296
22	14400	172	6690	2510	17	115	3000	31	251
23	11700 9750	110 78	3470 2050	2460 2220	17	113	2680 2340	0 6	217
25	8290	62	1390	2020	18	98	2080	30	168
26	6970	50	941	1870	18	91	1890	3.0	153
27	6060	54	884	1780	18	86	1710	30	138
28	5440	39	573	1760	17	81	1540	29	120
29	5000	31	418	2290	17	105	2010	28	152
30	5000	33	446	2700 2510	17 16	124 108	2090	21	152
Total	323650	<del> </del>	79539	93170		5276	179030		106270
		<b></b>		ļ -31,0	-	70,0			1

S Computed by subdividing day.

### QUALITY OF SURFACE WATERS, 1963

### MUSKINGUM RIVER BASIN--Continued

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

		JULY			AUGUST			SEPTEMBER	
		Suspende	d sediment		Suspende	d sediment		Suspende	d sedimen
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	1950	25	132	1340	18	65	720	23	45
2	1750	25	118	1200	17	5.5	702	23	44
3	1610	25	109	1120	17	51	675	23	42
4	1450	25	98	1360	26	73	630	23	39
5	1340	25	90	2020	51	278	614	24	40
6	1220	25	82	1760	3.2	152	614	24	40
7	1120	24	72	1580	24	102	614	25	41
8	1050	23	65	1360	2.3	84	590	25	40
9	980	. 25	66	1220	2.5	8.2	574	2.5	39
0	960	23	60	1240	26	87	566	24	37
1	930	22	55	1160	28	88	550	23	34
2	920	20	50	1110	31	93	542	23	34
3	920	18	4.5	1010	31	84	550	22	33
4	920	15	3.7	960	3.2	8.3	648	20	35
5	940	13	33	930	3.2	80	783	18	38
6	990	13	35	950	3.5	85	711	17	3.3
7	1100	12	36	880	33	78	6 5 9	17	29
8	1280	12	41	830	31	6.7	582	17	27
9	1320	12	43	810	28	61	. 542	17	25
0	1310	13	46	950	28	72	526	17	24
1	1360	16	59	1140	29	89	518	17	24
2	1340	17	62	1170	29	92	510	16	22
23	1460	17	67	1050	29	8.2	510	15	21
4	1340	17	62	950	29	74	502	14	19
25 • •	1190	16	51	870	3.2	75	486	13	17
26	1090	15	44	830	35	78	478	12	15
27	1010	16	44	783	35	74	502	11	15
8	1050	17	48	738	34	68	502	11	15
9	1170	18	57	711	3.2	61	502	11	15
30	1300	19	67	693	29	54	494	10	13
31	1220	19	62	684	25	46			
otal	37590		1936	33409		2615	17376		895

MUSKINGUM RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: B. Hottom withdrawal thole, C. temically dispersed; D. decandroin, N. in native water; Omethods of analysis: V. briner. S. sieve. V. visual accumulation theo. W. in distilled water)

	Mathod	jo .	analysis	SBWC	SBWC	SBN	
			2,000				
			1.000				
		eters	0.500				
		millim r	0.250	100			
	diment	Percent finer than size indicated, in millimeters	0.125	86	99	100	
	Suspended sediment	ze indi	se indic	0.016 0.031 0.062 0.125 0.250 0.500	96	96	88
	Suspe	than siz	0.031	94	0 0 0 0	97	
WALCE		ıt finer	0.016	8	79	91	
amen		Percer	002 0.004 0.008	77	2 6	67	
, ,			0.004	09		4	
on tabe			o	20	900	88	
r, pipet; 5, sieve; v, visual accumulation tube; w, in distinct water	Codimont	discharge	(tons ver day)				
o, sieve, v, vi	Sediment	concen- tration	(mdd)	387	555	1940	
r, pipet		Discharge (cfs)	İ	36000	14700	12200	
	Water	ling per-	(°F)				
	0	ling	point				
		Time (24 hour)		1630	2000	1100	
		Date of collection		Mar. 5, 1963	Apr. 20	June 6.	

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

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

DRAINAGE AREA.--556 square miles.

RECORDS AVAILABLE.--Marer temperatures: June 1962 to September 1963.

FRICORDS AVAILABLE.--September 1963.--Marer temperatures: Maximum, 82°F July 17-19, 25, 26, Aug. 1, 1963; minimum, freezing point on many days during winter months.

Temperature (°F) of water, June 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

	Aver-	age	77	7.5	27.9	1 1	11	6 4 6	37	33	335	43
ĺ	Ā	a										
		31	11	7.1	75	11	49		32	33	11	52
		30	4.5	17	7.5	11	51	50	33	32 32	11	55
		29	- 12	1 4	76	11	50	94	33	32	11	55
		28	t ¬	7 4	469	1.1	51	4 5	36	32	37	54 48
		27	7 4	4 4	7.7	1.1	4 5	4 4	35	32	34	51
		26	ن م	7 °C	7.5	11	4 8 4 5 5	47	36	32	34	51
		25	127	7. 1.	7.3	11	52	4 4 7 4	35	32	33	51
		24	α t- . 4	5.5	7.2	11	53	64	33	32	336	43
		23	7 7	7.4	76	11	55	4 8 4 6	35	32	33	43
		22	72	7.2	76	11	53	50	35	32	32	4139
aph)		21	7.7	7 7	77	65	58	50	35	32	34	4 0
thermograph		20	77	70	77	67	58	4 t 8 t 8	41 35	36	34	43
her		19	73	77	7.3	99	55	4 8 4	38	36	38	45
늏		18	30	7.7	74	71	560	4 9	38	9.6	34	45 45
uat		11	79	7.8	74	72	59	51	38	33	33	4 5
alcohol-actuated	Day	91	77	7:5	75	70	63	51	39	32	34	43
hol		91	4.6	75	74	72	64	51	36	33	34	4 0 4
10,		14	77	2 7	73	7.5	563	4 4 8 4	36	32	36	42
, 1,		13	7.1	4 70	7.5	7. 69	63	48	3.4	32	36	43
ethy1		12	1,1	a t	4 4	47.6	63	4 8 4 6	36	32	35	38
ons		н	77	ود بـ د ير	75 67	6.73	62	4 4 8	34	32	35	38
T I		01	7.9	70	4.4	73	58	51	3.8	9.9	34	38
Continuous		6	7 1	F 4	11	7.7	61	51	39	39	32	38
		8	77	۲. ۲	70	د م 6 م	6.1	51	38	36	32	38
•		L	5.7	α r	7.4	63	- 11	50	43 38	3.6	34	35
		9	73	۵ ۲ ۲	7 8	9 6	- 11	4 80	4 7	34	33	34
		ç	74	0 4	4 4	44	- ! !	50	44	3.5	38	34
		4	74	7.7	7.2	27	11	50 48	49	33	33	35
		3	7.2	7,5	α r C	74	11	50	4 5	34	33	38
		2	74 68	7 Y	7.7	76	11	5 0 4 8	4 4 8 4	32	33	36
		1	75	7.6 7.6	77	76	11	4 4	50 46	32	33	36
				11		- : :	1		11	11	1 :	: :
	1,000	MODE	June Maxımum Minimum	July Maximum Minimum	Minimum	September Maximum Minimum	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum	March Maximum Minimum

58	60	76 68		78	69
11	70	11	80 80 80 82 82 81 80 80 79 81 71 72 72 73 74 75 76 76 76 72 74	77 77 78 78 76 76 76 78 76 76 76 76 76 76 76 76 76 76 76 76 76	11
58	67	80 72	79	76	56
58	8 4	79	80	78	63
563	70	81 74	80 76	717	63
57 59 61 63 62 58 50 53 55 56 58 54	68	76     78     80     80     81     81     79     80       66     66     66     69     71     72     74     71     72	81	76	59
5.9	70	80 71	82	76	59
57	59	80	82 74	72	62 58
53	56	78	80	78	58
53	56	76 66	80	73	58
58	59	75	80	77	67
64 61 62 62 58 53 61 57 57 58 53 51	71 70 68 66 68 68 68 70 68 70 68 67 62 63 64 62	4,4	80	77	69
61	70	76	78	72	70
64	71	76	82 76	76	70
58	70 70 63	77	82 76	76	70
53	70	75	82	77	70
55	71	44	78	75	70
50	62	74 66	76	75	69
53	69	74	76	77	63
53	60	72	76	77	69
52	60	72	76	79	74
53	68	76	75	79	74
55	72	79	74	80	75
55	73	79	76 68	81	75
5.6	70	78	78	81	76
58	68	76	78	79	73
55	68	77	78 70	76	72
55	65	72	78	90	7,0
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77 60 61 61 55 55 58 56 55 53 55 53 55 53 59 59 59 59 50 50 50 50 50 50 50 50 50 50 50 50 50	1 57 60 63 66 65 68 68 70 73 72 68 60 60 69 67 71 71 71 51 52 56 58 61 60 60 61 64 66 60 55 57 60 62 62 62	74	81	90	44
57	51	73	80	82	74
11			- : :	- 1	
il eximum nimum	ximum imum	June Minimum 73 74 72 68 72 77 76 78 79 79 76 72 72 74 74 75 76 66 66 66 67 68 70 64 64	July Maximum 80 81 80 78 78 78 78 78 76 76 76 76 76 76 78 82 82 78 78 78 78 79 70 72 74 76 78 78 79 79 79 79 79 79 79 79 79 79 79 79 79	August Maximum Minımum	September Mer Minimum 74 74 76 76 74 72 73 74 75 56 68 66 63 65 65 65 65 66 66 65 56 65 65 68 66 62 58 58 58 59 59 61 63 56 63 64 55 65 65 65 65 65 65 65 65 65 65 65 65

73 73 75 75

54 53 60 70 70

MUSKINGUM RIVER BASIN--Continued

3-1475. LICKING RIVER BELOW DILLON DAM, NEAR DILLON FALLS, OHIO

LOCATION. --Temperature recorder at gaging station, 500 feet downstream from Dillon Dam, 2 miles northwest of Dillon Falls, Maskingum County, and 5.6 miles upstream from mouth. Maskingum County, and 5.6 miles.

RECORDS AVAILABLE. -Water temperatures: October 1961 to September 1963.
EXTREMES: 1962-63.-Mater temperatures: Maximum, 77°F Marg. 9-16, minimum, 34°F Feb. 28 to Mar. 2, Mar. 8-13.
EXTREMES: 1962-63.-Mater temperatures: Maximum, 78°F July 23-7, 1963; minimum, 34°F Feb. 28 to Mar. 2, Mar. 8-13, 1963.
EXTREMES: 1961-63.-Mater temperatures: Maximum, 78°F July 23-7, 1963; minimum, 34°F Feb. 28 to Mar. 2, Mar. 8-13, 1963.

Average

61 φ <del>,</del> 39

			- 1												
Temperature (°°) of water, water year October 1962 to September 1963.    1   2   3   4   5   6   7   8   9   10   11   12   13   14   15   16   17   18   19   20   21   22   23   24   25   26   27   29   29   29   29   29   29   29			31	52	11	8 8	38	1.1	6 4 9	11	99	11	76	72	11
Temperature ("T) of water, water year October 1962 to September 1963 (Continuous ethy) alcoholacticated thermograph)    1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1    12 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			30	53	<b>4 4 5 7</b>	38	3 8	11	9 4 9	54	99	72	75	72	66
Temperature (°P) of water, water Year October 1962 to September 1963 (Continuous ethy) alcobol—actuated thermograph) (PP) of water (PP) of water, water Year October 1962 (Continuous ethy) alcobol—actuated thermograph) (Continuous ethy) alcobol—actuated thermograph) (Continuous ethy) alcobol—actuated thermograph) (PP) (PP) (PP) (PP) (PP) (PP) (PP) (P		ĺ	29	3.0	1 1 1 2	38	8 8	11	4 6	200	63	72	75	71	999
Temperature ("F) of water, water year October 1963 to September 1963  Continuous ethyl alcohol-actuated thermograph)  Day 1			28	54	5 5 5 7	37	38	35	2 4 5	26	63	72	75	71	99
Temperature ("F) of water, water, year October 1868 to September 1963  Continuous ethyl alcohol-ectuated 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  25 2 5 2 5 2 6 6 6 2 6 2 6 2 6 2 6 2 6 3 6 3 6 4 6 4 6 4 6 6 4 6 6 4 6 6 4 6 6 4 6 6 6 6 5 6 5			27	56	4 4 5	37	3.3	35	4 6 2	5.5	63	72	75	71	99
Temperature (°°) of water, water year October 1962 to September 1963 (Continuous ethy) alcoholectused thermograph) the continuous ethy) alcoholectused thermograph			97	59	9 7 7	38	38	35	43	55	62	72	75	73	67
Temperature (°F) of water.  (Continuous ethy):    1			25		46	3 38	38	35	63	55	62	72	75		6.8
Temperature (°F) of water.  (Continuous ethy):    1	1963		24	62	46	38	388	35	6 7	56	62	72	75	74	69
Temperature (°F) of water.  (Continuous ethy):    1	er		23		4.6	38	3 4 8	36		57	62	71	75	74	99
Temperature (°F) of water.  (Continuous ethy):    1	di e		22	63	44	38	38	36	0,0	55	62	17	75	74	070
Temperature (°F) of water.  (Continuous ethy):    1	Sept ph)		21			38	3 38	36		5.5		71	75	74	71
Temperature (°F) of water.  (Continuous ethy):    1	to gra		20	<b>49</b>	8 4	38	37	36	0,0	53	62	17	74	74	17
Temperature (°F) of water.  (Continuous ethy):    1	962 erm		19	4 4		38	37	36	38	53		71	74	75	17
Temperature (°F) of water.  (Continuous ethy):    1	th		81	6.5	0 0 7	9 8	37	36	388	53	61	71	74	75	71
Temperature (°F) of water.  (Continuous ethy):    1	tob		17	6.5	4 8		38	36	38	53	61	71	74	76	71
Temperature (°F) of water.  (Continuous ethy):    1	r 00	Day	16	4 4	48	38	38	36	37	51.55	62	71	733	77	71
Temperature (°F) of water.  (Continuous ethy):    1	yea:		15	49	48	38	37	36	36	533	61	717	73	7.7	17
Temperature (°F) of water.  (Continuous ethy):    1	ter		14	49	48	38	37	37	35	50	61	717	73	7.7	72
Tomports turns  1 2 3 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		j	53	49	4 4 8 8	38	37	37	35	53	61	71	73	77	73
Tomports turns  1 2 3 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	ter,	Ì	12	63	48	38	38	37	34	53	61	71	72	77	73
Tomports turns  1 2 3 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	us e		=	633	4 8 4 8	38	3 8	37	34	50	61 59	7.1	72	7.7	73
Tomports turns  1 2 3 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	of Linu		22	63	8 4	38	388	37	34	55	58	69	72	7.7	73
Tomports turns  1 2 3 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	OF.		6	62	6 4 8	39	38	37	34	53	58	69		77	73
1	CC		∞	62		9 9	38	37	36 34	54	57 56	68	72	76	
1	rat		7	62	50	42	38	37	35	53	56 56	67 66	72	76 76	73
1	ешре		9	62				37		52				76 76	
1	Ĕ		2	62	50	43	38	37	35	52	56	99	72	76 76	73
- 30 00 14 00 00 00 14 00 00 00 00 00 00 00 00 00 00 00 00 00			4	62						52					
00 00 44 00 00 00 44 00 00 00 00 00 00			က	62	51	63	3.88	388	35	52	55	99	72	76	72
			2	62							54 54				
Month  October Maximum Minimum Maximum Minimum December Minimum Maximum Maximum Maximum Maximum Minimum Pebruary Maximum Minimum Maximum Minimum Maximum Minimum Maximum Minimum Maximum Minimum Maximum Minimum Maximum Minimum Maximum Minimum Maximum Minim															
Month  October Maximum Minimum Maximum Maximum December Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Minimum Maximum Minimum Minimum Maximum Minimum Maximum Minimu										: :	11		11		
		Month	MOREI	October Maximum Minimum November	Maximum	Maximum Minimum	January Maximum Minimum	Maximum Minimum March	Maximum Minimum	April Maximum Minimum	Maximum Minimum	Maximum Minimum	July Maximum Minimum	Maximum Minimum	September Maximum Minimum

# 3-1500. MUSKINGUM RIVER AT MCCONNELSVILLE, OHIO

JOCATION. --At bridge on State Highway 37 at McConnelsville, Morgan County, 0.5 mile upstream from gaging station and dam 7, and 3 miles downstream from Oilspring

October 1950 to September 1951, October 1954 to September 1963 RECORDS AVAILABLE, -- Chemical analyses: DRAINAGE AREA. --7,411 square miles.

Ciloride and specific conductancy: October 1960 to September 1963.

\*\*Rite temperatures: october 1960 to September 1963.

\*\*Rite temperatures: october 1960 to September 1963.

\*\*Rite temperatures: october 1960 to September 1963.

\*\*Rite temperatures: october 1960 to September 1963.

\*\*Rite temperatures: october 1960 to September 1963.

\*\*Rite temperatures: october 1960 to September 1963.

\*\*Rite temperatures: october 1964 to September 1963.

\*\*Rite temperatures: october 1964 to September 1963.

\*\*Rite temperatures: october 1964 to September 1963.

\*\*Rite temperatures: october 1964 to September 1963.

\*\*Rite temperatures: october 1965 to September 1964.

\*\*Rite temperatures: october 1965 to September 1964.

\*\*Rite temperatures: october 1965 to September 1964.

\*\*Rite temperatures: october 1965 to September 1964.

\*\*Rite temperatures: october 1965 to September 1964.

\*\*Rite temperatures: october 1965 to September 1965.

\*\*Rite temperatures: october 1965 to September 1965.

\*\*Rite temperatures: october 1965 to September 1965.

\*\*Rite temperatures: october 1966 to September 1965.

\*\*Rite temperatures: october 1966 to September 1965.

\*\*Rite temperatures: october 1966 to September 1966.

\*\*Rite temperatures: october 1966 to September 1966.

\*\*Rite temperatures: october 1966 to September 1966 to September 1966.

\*\*Rite temperatures: october 1966 to September 1966 to September 1966 to September 1966.

\*\*Rite temperatures: october 1966 to September 1966 by 15 flood-control reservoirs. Some regulation at low flow by powerplant above station.

		_					
	Oxygen	Un- fill- tered	000	۱۳۱	4   4   5   6	121211	~
	S S	Fil- tered	4-1-	! - !	- ( 0   -   -	101011	۱ ۳
		col-	998	111			18
		Hd	2.7.	7.7	7.5	0 1 8 1 8 7	8.0
	To-Specific tal conduct-	ance (micro- mhos at 25°C)	1550 1100 1110	901	602	629 1190 1170 1370	2040
	- 12 12	acidity as H+1					
	Hardness as CaCO,	Non- car- bon- ate	380 260 256	210	1100	145 277 276 327	477
	Hard as C	Cal- cium, mag- nesium	472 364 366	308	152 222  300	215 366 366 440	569
er 1963	Phos-Dissowed	solids (residue at 180°C)	1010 655 659	552	293 381 518	375 692 198 198 198 198	1360
ptem	Phos-	us as Po4	0.23	180.	90.	141511	.24
to S	į	rate NO <sub>3</sub> )	ნ. წ. 44 დ. 66	3.1	3.6	3.0	4.5
1962	Files.	ride (F)	6.0 4.	4:   4.	1:14.16.1	4   0   0 0	1.0
Chemical analyses, in parts per million, water year October 1962 to September 1963	;	Chloride (Cl)	322 186 184	130	75 68 111	85 224 212 298	478
ater year		(SO <sub>4</sub> )	192 160 164	139	103 103 140	68 155 163 171	172
, W		g # g			10110101		1.00
lllion		bon- ate (HCO <sub>3</sub> )	113 127 135	119	96	86 108 110 110 138	112
er	£	E E					
irts p	Po-	tas- sium (K)	7.1 5.3 5.0	111	1111111	111111	9.1
s, in pe		(Na)	122 75 75	111	11111111	111111	174
nalyse	Mag-	sium (Mg)	2222	111	1111111	111111	1 23
cal a	787	cium (Ca)	153 113 112	111	1111111	111111	190
Chem	Man-	ga- nese (Mn)	0.35	18:1	. 53 . 53 . 67	16.18.11	হ ।
		(Fe)	0.04	18:	5   5   5   5   5	14:11:11	a.00
	Alu-	mum (Al)					
		Silica (SiO <sub>2</sub> )	6.4.6	111	1111111	111111	2.4
	N e	ge	1280 1890 1800	2630 7820 3203	2360 30660 37500 12630 16800 3637 2890	6640 2110 1460 3060 1287 635	644 655
	Date	collection	Oct. 3, 1962. Nov. 1 Dec. 19	Jan. 1-11, 24, 28-31, 1963 Jan. 16	Feb. 19 Mar. 1-31 Mar. 20 Apr. 1-30 Apr. 1-30 May 1-31 May 22	June 1-21, 26-30 June 26 July 1-31 July 23 Aug. 1-28 Sept. 9-30	Sept. 6

a In solution when analyzed,

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7.9

248

420

4

118 156 64

801 122 40

6260

4620 10400

conductance)..... conductance)....

June 5 (maximum

2150

conductance)..... conductance)....

May 28 (maximum

7.3

984 670 0601 371

244 991 264

354

594

9

148 84

160

134

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ŀ 9. 2.4 3.8 3,5

6.4

91

124

232

364

989

۲. 4.

183 46

6.7

Tur-bid-ity

ŀ ł ļ Į 20 ţ ł 1400 ł ì 150 ŀ ŀ ŀ 1

MUSKINGUM RIVER BASIN---Continued

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

7.6 7.9 7.0 7.7 7.3 7.6 7.8 펌 Specific conductmhos at 25°C) 1040 746 1130 751 216 826 385 (microì ŀ at 180°C) magne-carbon-Non-188 169 232 206 243 257 ŀ 59 ŀ 92 Hardness as CaCO, ate Calchum, 258 150 343 270 352 329 ŀ 74 303 sium Chemical analyses in parts per million, January to September 1963. (Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidity) Dissolved solids (residue 158 736 200 230 981 644 454 704 Ni-trate NO,) 7.0 6.0 9.9 8.9 ŀ 5.3 4.9 1 5.6 5.0 Fluo-ride (F) 9.0 e. 4. ₹. 4. ņ 'n 1 ٦. Chloride (C1) 170 9 104 188 Ξ 1 120 34 Sulfate (SO<sub>4</sub>) 144 135 138 122 28 128 ļ 132 ł 7 1 Bicar-bonate (HCO<sub>3</sub>) 122 90 108 Po-tas-sium (K) Sodium (Na) Mag-ne-sium (Mg) Cal-ctum (Ca) Fe) Silica (SiO<sub>2</sub>) | Mean | discharge | (t) | (cfs) 29700 31700 2450 2100 2800 2730 2560 17400 5420 2120 5510 Apr. 1 (minimum conductance).....
Apr. 14 (maximum turbidity)..... mum conductance)...
Jan. 24 (minimum conductance)...... Feb. 20 (minimum conductance)..... Feb. 3 (maximum turbidity)..... Mar. 1 (maximum conductance)..... Mar. 7 (minimum turbidity)..... Apr. 19 (maximum conductance)..... conductance).... conductance).... Jan. 9, 1963 (maxi-Date of collection Feb. 27 (maximum Mar. 4 (maximum

	ł	1			1		;		;
	6.9				926 7.0		7.0		4
	1380	106	1570	9	926		1800 7.0		1360 6 7
-	301				213		405		281
	408	296	469		300		520		388
	794				520		1070		812
	2.9	2.4	6		2.6		1.6		2.4
_	.7	4.		:	9.		.7		9.
	280	146	320	1	139		395		265
	139	130	169	;	148		180		165
_	130	108	116	_	106		140		130
-									
_		<u>,                                      </u>							
-								_	
_							_		
	1030	2190	895		1270		563		715
1963 (maxi-	mum conductance)	conductance)	Aug. 27 (maximum conductance)	Aug. 12 (minimum	conductance)	Sept. 30 (maximum	conductance)	Sept. 13-14 (minimum	conductance)

MUSKINGUM RIVER BASIN--Continued

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

tinued		Turbid- Threshold	8 B-4 5 D8-4 25 B-4 270 0 1110 M-8 1-0 0 1-1 0 1
ber 1963Con		Cyanide (CN)	
to Septem		Nitrite (NO <sub>2</sub> )	
tober 1962	Ammonia	nitrogen as NH.	
ter year Oc	Organics	Alkyl benzene sulfonate (ABS)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
llion, wat	Orga	phenols as CeH <sub>B</sub> OH	
rts per mi	loxygen	Percent satu- ration	71 78 66 66 73 73 86 76 76 61
ses, in pa	Dissolved oxygen	Parts per million	888601 8877444 7.88647
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued		Date of collection	Oct. 3, 1962 Nov. 1 Dec. 19 Feb. 19 Mar. 20 Apr. 22 May 22 May 22 May 22 June 26 June 26 June 26

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

Chloride, in parts per million, and specific conductance, water year October 1962 to September 1963

	October		Nove	mber	Dece	ember	January			
Day	Chlo- ride (C1)	Specific conduct- ance (micro- mhos at 25°C)	Chlo- ride (C1)	Specific conduct- ance (micro- mhos at 25°C)	Chlo- ride (C1)	Specific conduct- ance (micro- mhos at 25°C)	Chlo- ride (Cl)	Specific conduct- ance (micro- mhos at 25°C)		
1 2 3 4 5	338 312 308 310 385	1630 1560 1550 1540 1770	180 175 180 195 198	1100 1100 1120 1160 1150	144   158 170	968  1020 1060	116 115 120 135 125	870 874 876 921 881		
6 7 8 9 10	405 348 402 418 370	1870 1650 1850 1880 1730	210 210 205 218 210	1180 1190 1180 1200 1160	165 185 100 100 265	1040 1110 789 777 1340	155 140 130 170 150	1000 945 903 1040 992		
11 12 13 14 15	300 290 382 388 442	1490 1450 1740 1740 1940	155 92 95 110 170	1040 733 708 761 917	195  225 222 222	1150  1270 1240 1240	150   	963		
16 17 18 19 20	360 272 240 318 358	1700 1430 1330 1550 1690	84 62 58 72 77	688 625 622 678 688	245 235 185 170 170	1300 1290 1150 1090 1090		===		
21 22 23 24 25	360 288 268 390 340	1690 1480 1410 1800 1660	78 106 79 80 80	680 777 689 684 684	190 200 230 202 200	1170 1160 1290 1180 1160	  90 	746		
26 27 28 29 30 31	270 252 210  225 210	1390 1310 1180  1230 1190	115 130 145 150 135	801 866 931 945 910	200 172 172 160 140 112	1170 1070 1070 1020 953 871	100 105 105 120	821 825 838 894		
	Febru	ıary	Marc	e h	Apri	1	Ma	ıy		
1 2 3 4 5	122 125 130 180 180	896 903 926 1080 1080	188 135 80 26 24	1080 901 654 330 324	34 35 33 37 43	385 405 411 436 461	87 86 84 120 120	696 692 670 800 804		
6 7 8 9 10	180 175 165 170	1070 1050 960 963 	32 11 10 76 76	310 216 223 436 440	48 50 55 53 66	500 497 529 537 588	121 120 119 118 96	814 814 820 818 764		
11 12 13 14 15	120 130 130  130	775 842 848  838	86 67 76 104 84	470 420 440 542 490	83 78 80 88 80	657 667 667 692 679	104 95 100 106 112	779 763 796 809 828		
16 17 18 19 20	100 105 145 115 104	759 756 930 828 751	68 66 66 72 64	434 454 438 462 451	101 96 99 1 <b>2</b> 0 89	750 747 768 826 742	106 120 118 117 121	818 865 859 859 882		
21 22 23 24 25	115 122 145 175 200	825 870 935 1030 1100	54 80 76 78 70	422 501 510 511 495	61 63 51 76 79	554 546 496 577 594	103 105 104 128 146	824 826 845 898 960		
26 27 28 29 30 31	188 1080 60 471 215 1130 53 454 185 1060 40 406 40 402 44 406 39 399		454 406 402 406	54 75 90 76 99	54 534 75 625 90 674 76 616		960 955 984 968 970 957			

### QUALITY OF SURFACE WATERS, 1963

### MUSKINGUM RIVER BASIN -- Continued

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

Chloride, in parts per million, and specific conductance, water year
October 1962 to September 1963--Continued

September Specific conduct-Specific conduct-Specific conduct-Specific conduct-Chlo-Chlo-Chlo-Chloance (microance (microance (microance (micro-Day ride (C1) ride (C1) ride (Cl) ride (C1) mhos at 25°C) mhos at 25°C) mhos at 25°C) mhos at 25°C) 997 1080 1380 1380 2 3 192 200 120 850 262 1130 252 1350 7 8 9 ----44 46 178 178 1130 1240 371 1050 230 40 411 411 384 384 202 926 12 13 14 15 1150 1150 1270 150 175 36 34 207 1070 255 278 1360 1080 18 252 148 1450 34 20 1430 23 250 202 1500 1560 295 \_\_ 1210 --25 228 ----27 28 796 844 840 165 198 124 124 126 1710 1700 1020 1550 370 238

--

93

MUSKINGUM RIVER BASIN--Continued

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

	Aver-	age	34	34	38	53	52	6.8	99	76	73	85	9.1	82	4	7.8	7.5
		31	1	;	4 5	1	;	7.3	10	1	1	89	84	7.8	•	;	ł
		30	-	ł	4 4 70 70	57	57	2.0	69	98	8 1	30	9.4	7.9	٥	7.1	69
		53	1	ţ	4 4 70 70	57	57	7.0	69	82	80	9	48	7.8	-	72	70
		28	34	34	4.5	57	55	7	69	82	80	87	4,	80	9/	73	7
		27	34	34	4 3 6 3	55	53	7.3	69	83	78	7	82	83	`	14	7.1
		26	35	34	4 4	53	52	7.1	6.8	7,8	75	9	82	83	-	9,2	7.1
		25	35	35	43	54	53	9	68	82	7,4	e.	8	80	7	7.3	7.1
		24	36	35	4139	55	54	73	68	79	73	e.	80	90	20	7.4	7.2
3		23	36	36	39	58	55	20	69	76	73	28	8	80	-		72
September 1963		22	37	36	39	58	58	7	2	7.3	73		85	62	Ç		74
ber		21	37	37	4.03	58	58	7.1	7.1	73	73	4	82	80	٠	7.8	16
ptem		20	37	35	40	59	57	7.2	7.1	74	73	58	83	77	7.5	79	76
Se		61	35	34	0 0	57	55	7.2	69	74	73	4	8	19		8.2	16
to to		82	34	33	39	55	52	70	6.8	74	73	8	4	81	7.8	8.1	16
February		12	34	34	3.8	52	6 4	7.0	69	73	72	8,8	81	8 1	11	80	76
ebr	Day	91	34	33	38	50	20	7.2	99	73	7.2	33	79	62	`	80	92
r,		15	33	33	38	50	64	99	99	7.2	72	6	16	79	1	77	75
water,		14	34	33	38	50	6,4	24	99	72	7.1	82	80	8.2	79	7.7	7.5
of		23	34	34	38	50	20	6,8	67	7.1	70	8.2	80	83	8 2	79	77
(°F)		77	34	32	37	2	64	70		72	7.1	4	462	9.4	8	83	4
		π	32	32	35	51	51	7.2	20	73	72	5	7.7	9.4	8	80	77
atur		9	33	32	35	5.1	51	7.2	69	73	1,	-	56	4	81		7.7
Temperature		6	35	33	35	51	51	64	99	7.1	70	6	8 8	9,	82	8.2	7.7
Теп		æ	35	34	36	5.1	51	9	49	10	69	6	9.5	9,	8 2		75
		2	35	33	35	52	51	6.5	63	74	70	8	81	84	8.1	77	74
		9	33	32	35 35	5 2	52	,	61	74	70	c c	9 2	85	6	11	75
		2	32	32	35	52	52	6.1	9	74	7.2	5	8 6	90 77	83	76	75
		4	32	32	36 35	5.2	52	. 1	29	73	72	4	82	98	4		92
		က	1	1	35	52	50	50	56	7.5	73	ď	8	98	83	7.8	77
		7	- }	1	35	20		ž	55	77	73	4	93		4		92
		-	1	1	3.5	47	45	7,5	5.5	77	7	or or			9.	79	76
	Month	MOIII	February Maximum	mnm	Maximum Minimum	April Maximum	nimum	May	imum	June Maximum		July	Minimum	August Maximum	Minimum	September Maximum	Minimum

## 3-1503. MUSKINGUM RIVER NEAR BEVERLY, OHIO

LOCATION. --At intake line to Ohio River Valley Water Sanitation Commission (ORSANCO) monitor at Ohio Power Company water intake near Beverly, Washington County, I miles upstream from Males, etc., and 1.1 miles upstream from Olive Green Creek.

DALIANGE AREA.--7 GOO square mailes, approximately.

RECORDS ANALABLE.--(Crematel analyses: July to September 1963.

RECORDS ANALABLE.--(Crematel analyses: July to September 1963.

REMARKS.--Dally samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Analyses were made on the maximum daily specific conductance for each month. Records of discharge are given for Males and Males and Males and Males are available in Descriptic Conductance for each month. Records of discharge are given for Males and Males and Males and Males are maximum and Males are maximum fally specific conductance for each month. Records of discharge are given for Males and Males and Males are maximum and Males and Males and Males are maximum fally specific conductance for each month.

1	Organics Phe-Alkyl	Col-nois ben- or as zene Ceds sulfo- OH nate			:	!	<b>!</b>	٠.	.1	ţ	1	-	: -	:		١
	Org:	as C <sub>6</sub> H <sub>5</sub> OH														
							_				_					
	O I	Hg Hg	0	2000		13/0 6.7	:	1300 7.3	1220 6.9	1350 6.9	931 7.0	1460 7.2		:	1570 6.8	1310 6.9
		(micro- mhos at 1 25°C)	-	130		137	3	130	122	135	93	146		-	157	131
		acid- ity as H+1				0 0	<b>1</b>	1	1	9	22			_	_	9
	Hardness as CaCO,	Non- car- bon- ate			-	9/5		'	'	326	225	1			357	286
		Cal- cium, mag- nesium						1	1	418	309	1			459	388
	Phos-Dissolved	solids as (residue Cal- po <sub>4</sub> at 180°C) cium, mag- nesium		i '	1 10	99	60#	1	1	814	549	1		ľ	966	822
1963	Phos	us as PO	9			1		.18	.12	1	1	15	-		1	1
mber	ž	(NO <sub>3</sub> )				, s	4	1	1	2.9	2.6	l			2.8	2.8
Septe	F															
in parts per million, July to September 1963	:	Chloride (C1)	310	017	202	242	77	248	212	260	139	288	) u	200	325	246
nillion,		Sulfate (SO <sub>4</sub> )		ł	1 5	242	121	1	1	178	154	1			178	172
per 1	ප්	Co at a											_			$\Box$
arts		bon- ate (HCO <sub>3</sub> )				? ;	122	 	\ 	112	102				124	124
	Po-	tas- sium (K)														
Chemical analyses,		Sodium (Na)														
ical a		sium (Mg)		!	1 8	Ç,	<b>1</b>	1	1	22	21			!	23	22
Chem	ځ			!	1 8	n 6	8	1	1	131	88				146	119
,		ga- nese (Mn)														
		Fe)														
	Alu-	Silica mi- (SiO <sub>2</sub> ) mm (Al)														
		Silica (SiO <sub>2</sub> )														
	Mean	discharge (cfs)	090			1230	2130	1160	1150	1860	1030	80			859	847
	Date	8	July 10, 1963 (maximum	July 20 (maximum	July 27 (maximum	July 1 (minimum	montunty)	Aug. 14 (maximum 8/11-20)	8/21-31)	monthly)	monthly)	Sept. 11(maximum	Sept. 26(maximum	Sent 3 (maximim	monthly)	Sept. 2 (minimum monthly)

MUSKINGUM RIVER BASIN--Continued

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

	Aver-	age	82 84 86
		31	8 1 1
		30	88 88 83 88
	İ	29	88
		28	1 98 22
		27	88
		26	8 8 8 8
		25	818
		10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	822 88
		23	78 81 87
963		22	8 1 8
r L		21	82
mpe		20	80 85 87
emperature (°F) of water, July to September 1963		61	8 8 8 8
o S		8	2   2
'n		17	883
3	Day	9	8388
ter,	Δ.	15	8 1 8 1
Wa		4	83 4
ğ		3	83 8 85 8
5		2	81 85 92
ıre		=	18 1 06 8 1 08
rati		0	8833
empe		6	888
ř		80	841
		7	84 84 87
			81 83 84
		4 5 6	832883388
		4	1 1 8
		3	86 82
		2	81 85 85
		-	1 88 1
	Moork	Month	July August September

### LITTLE KANAWHA RIVER BASIN

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

at Glenville, Gilmer County, 0.5 mile upstream from gaging station, and 0.7 mile upstream from Sycamore LOCATION. -- At waterplant

DAANMGE AREA.--386 square miles (at gage).

EXTREMES, 1962-03.--786 crober 1964 to September 1963.

EXTREMES, 1962-03.--784 and Fobratures: Maximum, 78°F on several days in July; minimum, freezing point on several days in December, 2 annary, and Fobratures: Maximum, 86°F on several days in August 1947, July and August 1955; minimum, freezing point on many days during winter months.

EXTREMES, 1966-03.--74 and Fobratures: Maximum, 86°F on several days in August 1947, July and August 1955; minimum, freezing point on many days during winter months.

REMARKS, --76mperature records furnished by West Virginia Water Service Company.

1963	
eptember	
o S	
ب	j
1962	
October	
year	
water	
water,	
of	ı
Ħ	ı
Temperature	

Aver-	26 27 28 29 30 31 age	40 39 37 36 36 34 49 36 34 33 33 33 ~~ 36 34 34 35 35 36 36 36	33 33 32 32 32 35 32 32 33 34 47 48 49 50 52 54 44	55 56 55 54 55 56 62 63 63 73 74 76 77 77 68	77 78 78 78 76 74 75 72 73 74 73 72 72 72 66 66 65 65 66 69
	24 25	36.0	3 3 3 4 7 4 7 4 7 4 7 4 7	3 54	5 76 5 65
	23 2	44 42 37 37 34 34	33 33 32 33 45	55 53 61 61 68 69	73 75 71 71 71 66 65
	22	40 35 34	403	59 62 69	73 70 67
	21	200	34	64 62 68	73 71 68
	19 20	54 55 36 36 33 34	37 36 34 34 47 46	63 63 69 62 69 68	78 72 70 70 69 68
	18	33 9 9 9	36 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	63 6	78 7 70 7 71 6
	17	33 33 3	36 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	57 64 67 67	78 70 72 72
Day	16	38	36 34 43	5.4 6.5 6.6	76 59 70
	15	388	37	54 65 66	73 68 70
	3 14	32 38	38 6 7 9 8	655	3 73 4 68 71
	12 13	32 32	2 8 4	6633	2 74 71 71 71 71
		53 54 39 40 33 33	36 38 38 43 43 44	52 52 64 62 69 68	72 73 75 75 70 72
	10	32 32	28.4	666	27.5
	6	33	4 50 4	53	75
	80	53 34	33 40 40	4 5 5 5	27 27 27
	7	3882	33		74 74 72 72
	9	246	8 4 9 3 3 3 4 4 4 6 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	2 64 62	72 73 73 72 73 72
	4 5	54 35 35 34 34	35 33 36 38	59 57 60 63 61 62	
	υ.	4 2 4	33 33 34 3	60 59 58 60 62 61	74 71 76 74 73 73
	2	33 33	36	59	75
	-	446	33 9	57	77 75 75
1	Hallow	October November December	January February March	April May June	JulyAugust

OHIO RIVER BASIN

### HOCKING RIVER BASIN

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

OCATION. -- At gaging station at Mill Street Bridge at Athens, Athens County, 3.5 miles downstream from Margaret Creek.

DRAINAGE AREA. --648 quarte miles.

EXECUDE ANTIALEE. --Chemical analyses: October 1964 to September 1963.

Mater temperatures: October 1964 to September 1963.

Mater temperatures: October 1964 to September 1963.

Mater temperatures: October 1964 to September 1963.

Mater temperatures: October 1964 to September 1963.

Sofinent records: October 1964 to September 1963.

Sofinent records: October 1964 to September 1963.

Syll Maximum. 144 ppm Mar. 1.31.

Syll Maximum. 145 ppm Oct 7. minimum. 174 ppm Mar. 1.31.

Specific conductance: Maximum daily, 44,000 tons Mar. 4; minimum daily, 1 ppm Oct. 25-27.

Specific conductance: Maximum daily, 44,000 tons Mar. 5; minimum daily, 1 ppm Oct. 25-27.

Specific conductance: Maximum daily, 26, minimum, 1300 ppm Mar. 1, minimum, 1500 ppm Peb. 7-8, 1955.

Hardness: Maximum daily, 26, minimum, 68 ppm Jan. 22-24, 1969.

Specific conductance: Maximum daily, 2300 pm July 19, 1900 mot. 4, 1957; minimum, 68 ppm Jan. 22-24, 1969.

Mater temperatures: Maximum daily, 21, 230 ppm July 8, 1968; minimum daily, 199 minimum, 130 ppm Peb. 7-8, 1965.

Mater temperatures: Maximum daily, 21, 250 ppm July 8, 1968; minimum daily, 198 minimum

		Col- or	10	4	က	2	1	1	1	1	ł	į	ļ	ł	1	1	1	1
		用	8.9	9.8	8.8	7.1	7.2	7.0	6.9	6.8	6.9	6.7	7.0	6.4	6,3		6.7	+
	Specific conduct-	ance (micro- mhos at 25°C)	1710	920	1020	652	209	665	445	648	716	892	973	1070	1280	586	843	1
	Total	ity as H <sup>+</sup> 1																
	Hardness as CaCO <sub>3</sub>	Non- carbon- ate	562				215				242				1	189	282	1
	Hardness as CaCO <sub>3</sub>	Cal- cium, c magne- sium	581	351	373	232	268	253	174	255	280	349	376	416	466	226	320	;
1963	Dissolved	solids (residue at 180°C)	1080	647	672	404	468	410	283	439	477	298	099	716	884	382	562	1030
mber ]	Ä	trate (NO <sub>3</sub> )	4.1	3.1	8.	2.7	8.8	3.8	3.4	2.4	1.7	1,2	1.6	1.8	2.2	3.2	2.6	9.8
September 1963		ride (F)	0.1	Ν.		.1	۲.	27	.2	۲.	ο.	.2	0.	e.	е.	0.2	0.2	0.5
water year October 1962 to		Chloride (C1)	292	112	122	73	89	89	30	43	22	71	2.2	98	88	48	73	128
rear Octol		Sulfate (SO <sub>4</sub> )	390	279	284	170	182	174	134	203	228	285	324	381	486	174	267	469
water		bonate (HCO <sub>3</sub> )	24	34	25	42	64	62	40	44	46	64	58	40	18	44	47	119
llion,	P <sub>0</sub> -	tas- sium (K)	5.8	9.0		1.9	ŀ	ł	ł	1	1	1	1	;	1	1	1	1
Chemical analyses, in parts per million,		Sodium (Na)	124	26	61	36	i	1	1	1	1	1	1	ļ	1	;	:	1
in par	Мад-	ne- sium (Mg)	55	32	36	50	ļ	1	ł	ļ	;	1	ì	1	1	1	ŀ	;
lyses,	-	cium (Ca)	142	83	96	09	1	!	!	ŀ	1	1	1	ł	1	1	ŀ	1
al ana	Man-	ga- nese (Mn)	2.8	2.3	6,3	.14	ł	1	ł	1	1	1	-	1	1	1	1	1
Chemic		Iron (Fe)	a0.01	a.00	a.01	a.00	1	ì	1	}	1	1	1	1	;	1	1	1
	1	inum (A1)																
		SiO <sub>2</sub> )	9.6	0.6	9.5	7.5	į	١	1	1	1	1	ļ	ŀ	1	ł	!	ŀ
	Moon	discharge (cfs)	136				872		5975	1111	525	243	179	104	71.4	b 927	ŀ	1
	400	Date of collection	Oct. 7, 1962	Nov. 1-30	Dec. 1-19	Dec. 20-21, 25-31	Jan. 1-31,1963	Feb. 1-28	Mar. 1-31	Apr. 1-30	May 1-31	June 1-30	July 1-31	Aug. 1-31	Sept. 1-30	Weighted average	Time-weighted average	Tons per day

a In solution when analyzed. b Mean discharge for 365 days; mean discharge for 332 days of chemical analyses, 996 cfs.

HOCKING RIVER BASIN--Continued

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

Analyses of additional samples

	Oxygen	Un- fil- tered	Ħ	-	-	-	81	4	2	-	-	n	-
	Cons	Fil- tered	Ŧ	н	н	н	H	H	0	0	H	H	H
		Col- or	9	9	9	1	1	1	1	1	1	İ	ŀ
		Hď	1140 6.7	6.9	7.1	1	1	1	1	1	1	1	1
	To-Specific	ance (micro- mhos at 25°C)	1140	1350	938	ł	1	1	1	T	l	1	ł
į	To- tal	acid- ity as H+1											
	Hardness as CaCO,	Non- car- bon-	394			1	1	1	1	1	1	1	-
		Cal- cíum, mag- nesium	420			1	-	1	1	1	1	1	1
ber 1963	Phos Dissolved	solids (residue at 180°C)		903		}	1	;	}	1	1	-	1
ptem	Phos	us Po4	0.07	ł	1	.05	.04	9.	.03	.21	.07	.24	.10
Se O	;	trate (NO <sub>3</sub> )	5.0	3.0	1.0	i	1	ł	ļ	1	l 1	1	1
1962		ride (F)	0.2	.2	.2	ŀ	1	i	ł	1	1	1	!
Chemical analyses, in parts per million, water year October 1962 to September 1963		Chloride (Cl)	16	181	132	1	1	1	1	1	į	1	!
ter year		Sulfate (SO <sub>4</sub> )	423	397	215	1	ŀ	ł	1	1	t I	1	1
, wa	Car	CO.		-	_	_	_		_	_	_	_	
1111on		car- bon- ate (HCO <sub>3</sub> )	32	33	-23	1	1	í	1	-	i	1	1
er n		ium (Li)											
arts 1	Po-	tas- sium (K)	3.8	4.3	2.9	!	1	-1	ł	1	1	1	1
s, in p		Sodium (Na)	92	101	26	1	1	ł	!	1	1	1	!
nalyse	Mag-	ne- sium (Mg)	36	46	30	1	1	ł	ł	ł	!	1	ŀ
ical a		cium (Ca)	109	114	85	ţ	1	1	;	ł	i	1	ł
Chem	Man-	ga- nese (Mn)	3.2	3.2	8.8	.70	1,4	.57	96.	1.9	.23	8.8	1.4
		Iron (Fe)	0.22	33	2.7			88.	.36	.05	.28	.25	.13
	Alu-	mi- num (A1)											
		Silica mi- (SiO <sub>2</sub> ) num (Al)	9.7	8.2	8.2	1	1	!	!	!	ł	ţ	ļ
		Mean discharge (cfs)	88									872	
	į	of collection	Oct. 3, 1962.	Nov. 1	Dec. 19	Jan. 16, 1963	Feb. 12	Mar. 20	Apr. 22	May 22	July 2	July 23	Sept. 6

Chemical analyses, in parts per million, water year October 1962 to September 1963 --Continued

	Dissolved oxygen	oxygen	Orga	Organics	Ammonta				
Date of collection	Parts per million	Percent satu- ration	Phenols as C.H.BOH	Alkyl benzene sulfonate (ABS)	nitrogen as NH <sub>4</sub>	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbid- Ti	Threshold odor
Oct. 3, 1962	7.9	79		0.2				8.0	ő
Nov. 1	10.4	86		٦.٥				m 1-	2 6
Jan. 16, 1963.	12,1	83		. 0.				25	Ch-8
Feb. 12	11.7	86		0.9				30	8-F
Mar. 20	۰. م	?		•				077	o 
Apr. 22		82		۰.				09	M-4
May 22	8.6	68		۲.				15	E-1
July 2		78		۲.				1	M-2
July 23		62		۲.				;	M-1
Sept. 6		7.1		.1				1	0

Chemical analyses in parts per million, January to September 1963

	Tur-	bid- ity	1	ł	1	1	90	}	1	240	1	ł	1	1	ł	1
(Amalyses based on maximum and minimum monthly specific conductor, and maximum monthly turbidity)	НД.		7.6	7.4	7.1	7.5	ŀ	6.9	6.8	1	7.2	7.3	7.2	7.0	7.6	5.7
	Specific conduct- ance (micro- mhos at 25°C)		875	348	879	520	1	802	263	-	801	362	832	566	1050	599
	Hardness as CaCO,		269	96	263	159		245	78	ŀ	287	102	282	177	331	294
		Calcium, magne- sium	338	130	334	196	1	304	16	1	328	138	328	210	408	299
	Dissolved as CaCO, solids (residue Calcium, Non-at 180°C) magne-carbon at un sium ate		576	210	554	304	1	206	158	1	566	220	556	352	700	504
	Ni- trate (NO <sub>3</sub> )		5.5	6.8	4.4	2.8	1	3.6	2.1	ŀ	2.0	2.2	1.9	2.2	1.4	1.9
	Fluo- ride (F)		0.2	.2	.2	.2	1	.2	۲.	1	ı.	.1	.2		۳.	£.
	Chloride (C1)		85	26	88	53	1	81	16	1	52	22	80	40	92	42
	9	(SO*)	233	80	240	127	1	220	74	l	275	95	248	169	324	292
specif	Bicar-	bonate (HCO <sub>3</sub> )	84	42	98	46	1	72	24	ŀ	20	44	26	40	94	9
(Analyses based on maximum and minimum monthly	Po-	Sium (K)														
	Sodium (Na)															
	Mag- ne- sium (Mg)															
	Cal- cium (Ca)															
	Iron (Fe)															
	Silica (SiO <sub>2</sub> )															
	Mean discharge (cfs)		280	4190	287	866	989	719	10200	3380	476	3780	330	099	112	498
		Date of collection	Jan. 28, 1963 (maxi- mum conductance)	Jan. 13 (minimum conductance)	Feb. 2 (maximum conductance)	Feb. 9 (minimum conductance)	Feb. 3 (maximum turbidity)	Mar. 1 (maximum conductance)	Mar. 20 (minimum conductance)	Mar. 2 (maximum turbidity)	Apr. 17 (maximum conductance)	Apr. 24 (minimum conductance)	May 28 (maximum conductance)	conductance)	June 27 (maximum conductance)	conductance)

HCCKING RIVER BASIN--Continued

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

Chemical analyses in parts per million. January to September 1963--Continued

	(Analyse	s base	d on ma	nical a ximum	nalyses and mini	in parts mum mont	per m: aly spe	allion, ecific o	January t conductanc	(Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidityContinued)	er 1963 rimum 1	onth]	turbidi	tyCon	(penut;			
	Mean	11.0		Cal-	Mag-	1	Po-	Po- Bicar-	an Marke	Chlorido	Fluo-	Ni-	Dissolved		Hardness as CaCOs	Specific conduct-		Tur-
Date of collection	discharge (cfs)	(SiO <sub>2</sub> )	(Fe)	cium (Ca)	sium (Mg)	(Na)	Sium (K)	bonate (HCO <sub>3</sub> )		(C1)	ride (F)	trate (NO <sub>3</sub> )	residue	Calcum, Non- magne-carbon- sium ate	Non- carbon- ate	~ =	摄	bid- ity
July 1, 1963 (maxi-	,									,								
July 24 (minimum	150							0	239	22	r.	1.0	874	447	447	1340 3.6	3.6	;
conductance) b	804							4	128	17	٥.	1,4	232	129	126	384 5.2	5,2	1
Aug. 16 (maximum													-					
conductance)	128							0	556	82	c.	2.8	915	484	484	1300	4.1	;
conductance)	96							40	342	92	۳.	2.6	899	392	359	896	8.9	;
Sept. 25 (maximum																		
conductance)	20							54	458	120	۳.	3,3	904	528	484	1330	6.5	;
Sept. 4 (minimum																		
conductance)	88							104	341	82	2.	5.9	734	420	335	1070 7.0	7.0	ţ

a Includes 1.1 ppm potential free acidity (H<sup>+</sup>), determined to pH 7.0. b Includes 0.1 ppm potential free acidity (H<sup>+</sup>), determined to pH 7.0.

HOCKING RIVER BASIN--Continued

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

	Aver-	age	57 43 33	32 42	52 69 69	73 72 66
			n 4 w	w w 4		
		31	418	32	1.61	281
		30	336	32	52 65 72	77 71 58
		29	346	32 1 9	52	55
		28	3 3 3 3	32	5.5 7.5 7.5	78 71 59
		27	3 8 6	32	200	75 71 59
i		26	36	32 32 50	222	73 68 59
23		25	33	32 32 45	84 0 0	73 72 59
1963		24	1 32	32	58	63 72 60
nber		23	52	33	55 62 67	73 71 65
September		22	7.4	32 32 40	58 62 67	75 70 62
Se (		21	33	32 32 40	5 6 9 6 9	75 75 70 70 68 62
2 C		20	58 43 33	32	61	75 70 66
1962		19	60 45 32	32 32 33 33 45 45	69	77 77 70 70 66 66
ber at (		18	63 455 32	32	50 64 68	74 68 65
nt		17	946	32 32 32 33 43 46	620	73 68 66
Of water, water year October (Once-daily measurement at (	Day	16	65 45 32	32 32 42	4,9 6,9	70 68 66
asu.	-	15	3 4 6 5	32 32 32 32 43 42	58	71 70 65
ater y me		4	63 43	35 40	5 8 8	71 72 66
, wa		13	32.5	32	5 6 9 6 9	70 71 75 72 70 66
ater ce-d		12	62 45 32	33	47	68 72 72
,¢ (0,¢		-	61 47	33	50 65 69	69 68 72 72 70 72
°₽)		10	62 46 33	33 36	50 66 72	
		6	43	33	50	70 69 72 72 69 70
Tempera ture		8	43	33 32 36	52	72 75 69
era		7	61 42 34	33 33 33 32 36	50	72 76 69
remp		9	66 40 38	33	50	72
•		5	97	32 33 33 32 	53	75 72 77 76 70 69
		4	36		57	
		3	35	32 32 32 32 32 34	537	75 72 77 77 70 71
		2	58 4.2 35	32	55	
		-	55 44 36	32	53	75 75 77 77 67 70
	Moneh	THOUSE THE	October November December	January February March	April May	July August September

## QUALITY OF SURFACE WATERS, 1963

## HOCKING RIVER BASIN -- Continued

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

Suspended sediment, water year October 1962 to September 1963

<u> </u>		OCTOBE		L	NOVEMBE			DECEMBER	
	14.	Suspen	ded sediment		Suspen	ded sedime		Suspen	ded sedime
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	85	2	т	149	3		1 228	13	
2	83	2	T I	132	3		1 213	11	
3	88	2	T	124	4		1 210	10	
4	172	3	1	118	4	ĺ	1 207	8	4
5	225	3	2	136	5		2 210	7	4
6	168	3	1	156	5		2 273	В	
7	136	J 3	i	170	6		3 313	11	3
8	206	3	2	165	6	1	3 302	13	1.
9	151	3	1	204	14	S 1	1 295	15	1.
10	130	3	1	2800	542	5 484	.0 280	j 14	10
11	122	3	1	3730	389	392	0 270	14	10
12	106	3	1	1870	124	5 69		14	10
13	105	3	i	812	26		7 250	1 13	1
14	101	3	iil	573	18		B 250	12	! (
15	94	4	1	435	15	1	.в 250	12	(
!					1				١.
16	92	5	1	367	14		4 263	11	
17	105 106	5 5	1	367 612	10		0 380 1 317	11 11	1
19	106	5	1 2	944	40	10		12	10
20	108	4	i	842	48	10		37	79
1		1			1			1	l
21	101	4	1	650	34		0 1350	111	404
22	95	3	1	662	16	2	8 1700	105	482
23	94	2	1	520	6		8 1400	83	314
24	88 90	2	T	384 325	5		5 1100 5 788	61 37	18
2 2	70	1	'	327			, , , , ,	7,	
26	92	1	T	302	В		6 770	21	44
27	95	1	T	273	В		6 622	14	24
28	99	2	1	253	9		6 562	12	1.0
29	108	2	1	243	9		6 963		E 210
30	126 185	3	1 1	240	12		B 1600 - 1300		E 260
-+		<del>                                     </del>							
otal	3668		29	18558	<u> </u>	997	5 18041		2354
		JANUAR	Y		FEBRUAR	Υ		MARCH	
1	850	20	46	243	19	1	.2 710	115	S 44
2	650	16	28	287	21	1	.6 , 3380	609	5560
3	490	15	20	680			5 3760	396	4020
4.0	431	15	17	1030 758	25	E 16		1300 800	A 19000 B 44000
5	400	14	15	/58	25	, ,	20200	800	B 44000
6	371	13	13	794	25	A 5	5 26600	360	B 26000
7	358	12	12	1050	75	A 21		260	B 15000
B	349	11	10	1320		E 26		183	5290
9	349	10	9	998	33		9 4540	261	3200
10	393	10	11	740	22	4	4 3860	227	2360
11	2000	464	S 3690	908	26		3920	200	2120
12	5150	686	9590	1020	36	3	9 4220	209	2360
13	4190	335	3790	794	35		5 3980	178	1910
14	1980	252	1350	644	29		0 2860	162	1250
15	1340		E 500	550	24		6 2140	142	820
	10/0			4.30	22	.	5 2140	150	86
16	1040 800		E 180 E 75	420 360	20		5 2140 9 6700	594	10700
18	750	17	34	371	20		7910	365	7800
19	650	13	23	515	19		6 8490	425	s 1060
20	600	13	21	770	19		0 10200	283	7790
21	550	13	19	764	19		8810	300	7140
22	460	14	17	590	19		6500	171	3000
23	435	15	18	510	18	2	5 3060	283	2340
24	398	15	16	430	17	2	0 2710	167	1220
25	360	15	14	430	17	2	2010	105	570
26	330	16	14	400	17	١,	.8 1610	92	400
27	300			320	16		4 1870	96	485
28	280	16 17	13 13	298	14	;	1 1840	96	47
29.	270	17	12				1540	75	313
30	260	18	13			-	- 1340	68	246
31	250	18	12			-	- 1420	73	280
otal	27034		19595	17994		161	.3 185229		187564

S Computed by subdividing day. T Less than 0.5 ton.

a computed from partly estimated-concentration graph. B Computed from estimated-concentration graph.

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

Suspended sediment, water year October 1962 to September 1963--Continued

		APRIL			MAY			JUNE	
		Suspen	ded sediment		Suspen	ded sediment		Suspen	ded sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	1450	76	298	1020	46	127	274	10	7
2	1270	63	216	888	37	89	254	10	7
3	1100	49	146	764	36	74	241	9	6
4	1010	47	128	698	36	68	250	. 8	5
5	918	47	116	630	34	58	284	7	,
6	828	44	98	590	33	52	452	25	A 30
7	780	42	88	543	27	40	556		E 40
8	725	37	72	507	17	23	498	17	23
9	708 681	34	65 53	480	11	14 12	498 412	14	19
10	991	29	, ,,	452	1	12	412	13	14
11	615	23	38	420	12	14	344	10	9
12	570	17	26	393	14	15	278	7	5
13	543	17	25	432	16	19	241	7	4
14	525 502	17 16	24 22	912 660	55 34	S 145 60	216 201	7 7	4
		Į.		į.	1			1	
16	480	14	18	512	23	32	184	7	3
17	476	13	17	464	19	24	176	7	3
18	543 747	16 53	23 107	480 464	17 15	22 19	163 153	7 7	3
20	1500	154	S 787	452	14	17	145	7	3
i					1				1
21	2100	246	S 1450	670	24	43	148	7	3
22	1590	74	318	590	16 15	25 19	145 137	7 7	3
23	2720	369	S 3210 S 3520	464 404	15	16	128	! 4	3
24	3780 1970	393 248	S 3520 1320	372	14	14	118	ì g	2
- 1									
26	1380	78	291	351	13	12	116	9	3
27	1090	49	144	326	12	10	112	10	E 7
28	930 840	43	108 100	330 372	11	10	153 260		E 7
30	960	44	100	334	10	9	162	26	11
31				295	10	8	1 - 22		===
Total	33331		12937	16269		1099	7299		260
		JULY			AUGUST			SEPTEMBE	R
1	150	23	9	106	9	2	104	6	2
2	124	22	7	100	10	3	98	6	2
3	114	18	6	88	10	ź	88	! 7	2
4	106	16	4	92	9	2	88	9	2 2
5	108	14	4	84	10	2	90	10	2
4	100	14	4	74	9	2	82	10	2
7	96	14	4	84	8	2	69	9	2
8	94	12	3	130	7	2	67	ģ	2
9	86	10	2	158	7	3	65	8	1
10	84	8	2	130	7	2	64	7	1
11	69	8	1	139	6	2	62	6	1
12	74	8	2	124	5	2	64	7	1
13	74	8	2	112	4	1	4 80	8	2
14	88	9	2	162	4	2	116	10	3
15	104	11	3	155	3	1	122	11	4
14	102	9	2	128	3	1	104	12	3
16	102 96	9	2	128	3	1	84	13	3
18	86	8	2 2	94	3	î	69	13	2
19	80	8	2 2	88	4	1	64	13	2
20	108	8		96	4	1	60	11	2
21	426		E 75	102	4	1	58	11	2
22	390 872	27 49	28 S 137	104 98	5	1	54 53	11	2
23	872 804	49	5 137	86	5	1	52	10	1
25	344	23	21	82	5	i	50	. 8	î
26	170	18	8	80	6	1	48	7	1
27	137	16	6	74	6	1	48	7	î
28	122	16	5	73	5	1	48	6	1
29	116	15	5	69	4	1	46	7	1
30	114	13	4	86	4	1	45	6	1
31	106	10	3	118	4	1	-		-
otal	5544		455	3220		46	2142		53

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

HOCKING RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: B. bottom whofrawal tube; C. Chemically dispersed; D. decanization N. in native water; D. niner: S. siece: V. sieres securanistics the W. in distilled water)

	Mathod	Jo .	analysis	SBWC	SBWC
			2,000		
-			1.000		
		eters	0.500	100	
		Percent finer than size indicated, in millimeters	002 0.004 0.008 0.016 0.031 0.062 0.125 0.250 0.500		100
	liment	ated, ir	0.125	86	66 66
	Suspended sediment	e indica	0.062	6	94
-	Susper	than siz	0.031	93	91
		finer (	0.016	84	78
		Percen	0.008	72	65 44
			0.004	28	54 30
,			0.002	47	45 20
, piper, c, arre, , , trans mecanismes,	Sodiment	discharge	(tons per day)		
, , ,,,,,,	Sediment	concen- tration	(mdd)	099	1840
		Discharge (cfs)		2670	7140 7140
	Water tem-	per-	(°F)		
	5	ling	point		
		Time ling per-		1600	1700
		Date of collection		Jan. 11, 1963,	Mar. 4

## THIO RIVER MAIN STEM

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

LOCATION.---About 650 feet upstream from lock and dam 22, at Ravenswood, Jackson County, 450 feet downstream from Sandy Creek, and about 1.5 miles downstream from Turkey Run.

CORDS AVAILABLE. -- Chemical analyses: October 1954 to June 1963 (discontinued). Water temperatures: October 1954 to June 1963 (discontinued). RECORDS AVAILABLE. -- Chemical analyses: DRAINAGE AREA, -- 39,840 square miles.

EXTREMES, October 1962 to June 1963 - Dissolved solids: Maximum, 498 ppm Oct. 1-23; minimum, 128 ppm Mar. 1-5, 8-31.

Hardness: Maximum 424 ppm Oct. 1-23; minimum, 72 ppm Mar. 1-5, 8-31.

Hardness: Maximum 424 ppm Oct. 1-23; minimum, 175 ppm Mar. 1-5, 8-31.

Water temperatures: Maximum not determined; minimum, freezing point omany days during whiter months.

Hardness: Maximum, 500 ppm Nov. 11-15, 17, 1967; minimum, 176 ppm Nov. 11-15, 17, 1967; minimum, 176 ppm Mar. 28-31, 1960.

Hardness: Maximum 4041y, 4,220 minimum, freezing point om many days during whiter months.

Water temperatures: Maximum 421y, 4,220 minimum, freezing point on many days during whiter months.

Water temperatures: Maximum 421y, 1,220 minimum, freezing point on many days during whiter months.

REMEMENS --Records of specific conductance and ph Not daily samples available in district office at Columbus, Onlico. No discharge records available.

Chemical analyses, in parts per million, October 1962 to June 1963

		Color											
		甁			_	_			_				
	Specific conduct-	<u> </u>	794	367	378	380	406	509	320	448	373		402
	Hardness as CaCO,	Calcium, Non- magne-carbon- sium ate	225	72	94	100	86	56	82	121	86		104
		Calcium, magne- sium	240	113	119	126	128	72	110	149	124		130
	Dissolved	~ a	496	235	223	232	246	128	181	259	209	;	240
100	Ä.	trate (NO <sub>3</sub> )		2.4				6	3.5	3.4	5.9		3.9
2	Fluo-	ride (F)	9.0	2.	.2	.2	٥.	c		. 2	۲.		0.2
memical analyses, in parca per mittion, occoper took to came took	(h)	(CI)	92	21	33	28	32	15	27	32	26		32
, ,	ojejino	(SO.)	237	16	93	96	66	24	: æ	127	102		107
1111	Bicar-	bonate (HCO <sub>3</sub> )	18	20	30	32	36	ç	2 7	8	32		31
מה זשת	Po-	Sium (K)											
dece,	sani poo	(Na)											
alla Ta	Мад-	sium (Mg)											
CHEMPT	Cal-	cium (Ca)											
		(Fe)											
	11.0	(SiO <sub>2</sub> )											_
	Mean	discharge (cfs)											
		Date of collection	Oct. 1-23, 1962	Nov. 16-30 a	Dec. 1-31	Jan. 1-9, 13-15,1963	Feb. 1-28	1000	Ann 1-30	May 1-30	June 1-30	Time-weighted	average

a Sample for Nov. 28 contained 28 ppm alkyl benzene sulfonate (ABS).

specific conductance	The second second
ă	
extremes	
thly	
monthly	
o o	
pased	Ī
Analyses	

AMALYSCS DASEG ON MONITURES OF SPECIFIC CONGRETANCE	samerive fi	or shear	TC CODUME	cance							
Oct. 2, 1962 (maxi-		_	:								
Oct. 9 (minimum)	34	251	9.6		2.6	540 459	233	302	735	7.4	
Nov. 17 (maximum)	92		26	1.0	1.0		113		471	471 7.0	
NOT. SO (MAINTIME)	08		7.7	•	2.2		44		298	×.	
Dec. 18-20 (maximum)	32		44	ε.	5.8		140		442	442 6.6	
Dec. 22 (minimum)	28		22	.2	3.5		80		261	6.9	

OHIO RIVER MAIN STEM -- Continued

3-1596. OHIO RIVER AT LOCK AND DAR 22, AT RAVENSWOOD, W. VA. --Continued Analyses based on monthly extremes of specific conductance--Continued

		Color	:					
		핊	8.8	7.0	6.9	11	6.9	7.0
	Specific conduct-	(micro- mhos at 25°C)	408 324	499 314	248 108	359	481 368	378 360
	Hardness as CaCOs	Non- carbon- ate	107	106 82	70	93	137	105 98
		Calcium, magne – sium	137	148 104	37	124	162	128 129
per	Dissolved	(residue Calcium, Non- difference at 180°C) magne-carbon- mhos sium ate at 25°C	246 190	292 189	143 94	213 115	302	223 210
ontin		trate (NO <sub>s</sub> )	5.5	4.5	2.5	3.2	3.5	3.5
963	Fluo-	ride (F)	6, 6,	44	0.0	4.4	6.4.	2.1.
Chemical analyses, in parts per million, October 1962 to June 1963Continued	of include		31 25	44	7.0	32 17	30	26 24
ober 1962	0116040		101 78	114 83	69	89 56	148 101	108 97
ion, Oct	Bicar-	bonate (HCO <sub>3</sub> )	37 32	52	18	38	34	38
m111:	P 2	stum (K)						
parts per		(Na)						
ies, in	Mag-	sium (Mg)						
analys	Cal-	cium (Ca)						
emical	1	(Fe)						
ີ	65	(SiO <sub>2</sub> )						
	Mean	discharge (cfs)						
		Date of collection	Jan. 9, 1963 (maxi- mum)	Feb. 10-11 (maximum) Feb. 1-3 (minimum)	Mar. 28 (maximum)	Apr. 18 (maximum)	May 30 (maximum)	June 1 (maximum) June 15 (minimum)

OHIO RIVER MAIN STEM--Continued

eq

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VA	
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RAVENSWOOD,	
ΑT	
22,	
DAM	
AND A	
LOCK AND	
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RIVER	
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OHIO	
3-1596.	

		age			
	Αv	ag	118	34	76
		31	32	1 1 4	111
		30	44 44	1 1 2	55 74 74
		29	44 44	1 1 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	59 68 78
		28	45 44	35 36	58 59 53 55 77 77
		27	45	35	58 77
		26	141	34 35	57 57 54 56 75 77
		25	47	34	57 75
		24	64 48 47 37 36	33 33 43	56 56 52 75 76
65		23	64 48 37		56 75
Temperature (°F) of water, October 1962 to June 1963 (Once-daily measurement at 0600)		22	65 65 49 48 37 37	34 34 35 32 42 42 43 43	54 54 54 54 54 54 54 54 55 55 55 56 56 56 57 57 58 59 59 59 59 57 57 58 59 59 59 59 59 59 59 59 59 59 59 59 59
June		21		35	55
to 7		20	65 49 37	34 34 35 32 42 42 43 43	55 74
060		19	65 50 37	34	55 58 74
e (°F) of water, October 1962 to (Once-daily measurement at 0600)		18	50 37	35 32 33 33 42 43 43 42	54 54 74
obe		17	68 68 50 50 37 37	33	54  74
Oct	Day	91	68 68 50 38 38	35 13 42 43	54 54 54 54 65 65 65 65 77 74 75 74
er,		15	70 68 68 50 38 38 38	35	54 65 75
wa t		4	38	35 35 34 32 42 42	54 54 65 65 77 74
of dai		13		35	54 65 77
(°F)		12	69 38 35	36 34 40 40	54 65 77
o.		Ξ		36	54 65 77
ratı		10	70 69	35	53 54 60 65 77 77
mpe		6		33	53 60 77
Ţ		œ	70 70	33 33	52 52 60 60 76 76
		7	513	33 33	52 60 76
		9	45 45	33 33 32 32 32	51 60 76
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1 45	33 33 32 32 32	51 51 60 60 76 76
		4	66 66		51 60 76
		е	99	33 33 32 32 32	50 51 60 60 75 76
		2	99		49
		-	114	32 33 32 32 32 32	47 59 75
	10000	- Innow	October 66 November December 44 44	January 32 33 February 32 32 March 32 32	April 47 49 50 51 51 52 52 53 54 54 54 54 May 59 60 60 60 60 60 60 60 60 65 65 65 51 June 75 75 75 75 76 76 76 76 77 77 77 77 77

months

days during winter

## KANAWHA RIVER BASIN

3-1765. NEW RIVER AT GLENLYN, VA.

to September 1956 EXTREMES, 1962-63. --Mater temperatures: Maximum, 77°F July 1, 2, 20, 29, and Aug. 25; minimum, freezing point on several days LOCATION. --At the Glenlyn steam electric plant of the Appalachian Electric Power Company, across the river from the gaging April 1930 to March 1931, October 1949 to September 1950, October 1951 station, 0.3 mile upstream from East River, and 6.3 miles downstream from Wolf Creek. DRAINAGE MEA.-4.7 de equare miles. April 1930 to March 1931, October 1949 to Septer RCOORDS AVAILABLE.—Chemical nailyses: April 1930 to March 1931, October 1949 to Septer Water temperatures: October 1950 to September 1963

EXTREMES, 1951-63. -- Water temperatures: Maximum, 84°F June 28, 1952; minimum, freezing point on many

in December, January, and February.

## KANAWHA RIVER BASIN--Continued

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

LOCATION.--Temperature recorder at Bluestone Dam #filling basin, 1,000 feet above gaging station, 0.9 mile upstream from mouth of Greenbrior River, and 2.2 miles upstream from Hinton, Summers County.
DANIMAGE MEMA-4,604 square miles.
RECORDS AVAILEDE --Water temperatures: May 1953 to September 1963.
EXTREMES, 1962-63.--Water temperatures: Maximum, 80°% on severall days in July and August; minimum, freezing point on several
EXTREMES, 1963-63.--Water temperatures: Maximum, 88°% Aug. 26, 1959; minimum, freezing point on several days in 1958 and 1961-63.

Temperature °F of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

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KANAWHA RIVER BASIN---Continued

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

LOCATION.--At city waterplant, at Marlinton, Pocahontas County, 1 mile upstream from mouth, and 2 miles downstream from discontinued graging station.

DAINAGE AREA.--108 square miles (at discontinued gaging station).

RECORDS AVAILABLE.--Water temperatures: October 1946 to September 1963.

EXTREMES, 1962-63.--Water temperatures: Maximum, 78°F July 18, 20, and Aug. 1, 3; minimum, freezing point on many days during EXTREMES, 1964-63.--Water temperatures: Maximum, 82°F July 24, 1952, July 2, 1959; minimum, freezing point on several days during winter months.

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Minimum

## KANAWHA RIVER BASIN---Continued

## ٧A. AT KANAWHA FALLS, W. RIVER 3-1930, KANAWHA

and miles downstream from confluence of New River toll bridge, 0.8 mile downstream from village of Bridge, and 2 downstream from Gauley feet downstream from station, 150 gaging miles Kanawha Falls, Fayette County, 2 LOCATION. -- Temperature recorder at Gauley River.

RECORDS AVAILABLE. -- Water temperatures: DRAINAGE AREA. -- 8,367 square miles.

December 1 Maximum, 1 EXTREMES, 1962-63. --Water temperatures: EXTREMES, 1958-63. --Water temperatures: REMARKS. --Recorder stopped Sept. 19-30.

1957 to September 1963. Aug. 3, 4; minium, freezing point on several days in December and January, 83°F Aug. 20, 1999; minimum, freezing point on several days in 1958-60 and 1963. e °F of water, water year October 1962 to September (Continuous ethyl alcohol-actuated thermograph) Maximum, °F of **remperature** 

KANAWHA RIVER BASIN--Continued

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

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

October 1950 to September 1963. Maximum,  $92^\circ\mathrm{F}$  on several days in August 1955 and 1959; minimum, freezing point Feb. 10, County.

RECORDS AVAILABLE.—-Water temperatures: October 1950 to September 1963.

EXTREMES, 1950-63.—Water temperatures: Maximum, 92°F on several days in August 19 1951.

1951 and Peb. 14-16, 1958.

REWARKS.—-Temperature records furnished by the Appalachian Electric Power Company.

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## KANAWHA RIVER BASIN--Continued

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

LOCATION.—-Temperature recorder at gaging station on downstream side of pier of highway bridge at Sutton, Braxton County, 0.5 mile upstream frow Granny Creek, and 2.5 miles downstream from Wolf Creek.
BROKING MAINLEM.—-543 square miles.
RECORDS AVAILABLE.—-Water temperatures: March 1960 to September 1963.
RECORDS AVAILABLE.—Water temperatures: Maximum, 71°F Aug. 37, 28, 30, and Sept. 2; minimum, freezing point Feb. 25, 26.
EXTREMES, 1960-63.—-Water temperatures: Maximum, 85°F Aug. 30, Sept. 1, 1960; minimum, freezing point Feb. 25, 26, 1963.

Temperature °F of water, water year October 1962 to September 1963 (Continuots, ethal alcohol-actuated thermograph)

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## KANAWHA RIVER BASIN--Continued

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

LOCATION.--Femperature recorder at gaging station opposite mouth of Birch River, at village of Glendon, 2.2 miles upstream from Strange Creek, and 2.2 miles southwest of France(Order), Braxion County.
DAINIGE AREA.--752 square miles (including that of Birch River).
RECORDS AVAILABLE.--Water temperatures: November 1960 to September 1963.
RECORDS AVAILABLE.--Water temperatures: Maximum, 78°F July 18-21, minimum, freezing point on several days in February.
EXTREMES, 1960-63.--Water temperatures: Maximum, 81°F Aug. 10, 1962. minimum, freezing point on several days during winter

months,

Temperature of of water, water year October 1962 to September 1963

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## KANAWHA RIVER BASIN -- Continued

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

LOCATION.—Temperature recorder at gaging station at downstream side of pier of highway bridge at Clay, Clay County, 0.9 mile and solvent toom Buffalo Creek, 2.1 miles downstream from Lower Two Run Creek, and 53.2 miles upstream from mouth. Or BECHOS ANAILBEE.—Temperatures: November 1980 to September 1960.
EXTREMES, 1982-63.—Mater temperatures: November 1980 to September 1980; Feb. 22-26.
EXTREMES, 1980-63.—Mater temperatures: Maximum, 84°F Aug. 21, 22, 1982 and July 18, 1963; minimum, freezing point on several days in Fobruary 1961.

Temperature 'F of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

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	Month	October Maximum . Minimum .	November Maximum . Minimum .	December Maximum . Minimum .	E E	ry imum imum	Maximum .	April Maximum . Minimum .	May Maximum . Minimum .	June Maximum . Minimum .	mnm mnm	E C	September Maximum . Minimum .

## KANAWHA RIVER BASIN--Continued

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

LOCATION. --Temperature recorder at gaging station, 50 feet upstream from Queen Shoals Creek, 100 feet downstream from highway bridge at Queen Shoals, Katawhan County, and 4 miles upstream from Big Sandy Creek.

BRINANGE AREA. --1,145 square miles (including that of Queen Shoals Creek). Teckly are that of Queen Shoals Creek.

RECORDS ANAILABLE. --Water temperatures: November 1960 to September 1963.

EXPREMES, 1960-63. --Water temperatures: Maximum, 84°F July 2, 3, 1963; minimum, freezing point on several days during January and February 1963.

Temperature oF of water, water year October 1962 to September 1963

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117

## KANAWHA RIVER BASIN--Continued

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

LOCATION. --Temperature recorder at gaging station at old lock 6, 1 mile upstream from Davis Creek, 1.5 miles downstream from Twomile Creek, 2 miles downstream from Patrick Street Bridge at Charleston, Kanawha County, and 3.5 miles downstream from Elk

ARKNAKAS KARA, --10, 449 square miles.

RECORDS AVAILABLE --10 square miles.

RECORDS AVAILABLE --10 ster temperatures: March mun, 91°F Aug. 5°, minimum, 34°P Dec. 15°, 16.

EXTREMES, 1962-63.--Water temperatures: Maximum, 95°F Aug. 5°, 26, 1999; minimum, 34°P on several days in 1961-63.

EXTREMES, 1963-63.--Water temperatures: Maximum, 95°F Aug. 5°, 26, 1999; minimum, 34°P on several days in 1961-63.

EXTREMES, 1963-63.--Water temperatures: Maximum, 95°F Aug. 5°, 26, 1999; minimum, 34°P on several days in 1961-63.

EXTREMES, 1963-63.--Water temperatures: Maximum, 91°F Aug. 5°, 26, 1999; per temperatures: Maximum, 91°F Aug. 5°, 26, 1999; per temperatures: Maximum, 91°F Aug. 96°

Temperature °F of water, water year October 1962 to September 1963

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## KANAWHA RIVER BASIN--Continued

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

DOCATION .--At intake line to Ohlo 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.

DRAINGE AREA—11780 square miles.

\*\*CRORDA WAILLABLE...—Chemical analyses: October 1965 to September 1963.

\*\*Rater Februaries of Cotober 1966 to September 1963.

\*\*Rater Februaries of Cotober 1966 to September 1963.

\*\*Rater Februaries of Cotober 1966 to September 1963.

\*\*Rater Februaries (Cotober 1966 to September 1963)

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KANAWHA RIVER BASIN--Continued

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

	<u> </u>	trite (NO <sub>2</sub> )		1	1	ł	1	ŀ	!	ŀ	1
	Am- nonia	gen as NH		!	1	1	1	- 1	1	1	1
	Alkyl Am- ben-monia			ł	1	0.1	7.	1	1	۲.	.2
		- LOJ									
		Hd.		5.5	6.2	4.9	6.3	716 6.6	6.3	6.5	4.9
		ance (micro- mhos at 25°C)		631	198	424	388	71.	559	638	703
pa		H+1		141	34				98		$\dashv$
ntinu	Hardness as CaCO3	Non- car- bon-	L						-		
30		Cal- clum, mag- nesium		157	09	ł	1	158	132	1	-
ber 196		solids (residue at 180°C)		378	118	1	1	398	297	1	ł
eptem	hos	us ass PO4		1	1	0.30	16	1	1	.32	.34
to S	, E	rate P		0.4	5.0	Ī	1	Ŋ	٦.	ı	1
1962	Fluo-	ride trate p (F) (NO <sub>3</sub> )		I	!		1	- 1	;	1	1
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued		(C1)		116	20	1	1	133	98	1	1
ater yea		(SO <sub>4</sub> )		65	30	48	53	73	75	78	67
on,		2 # B									$\exists$
m1111	Bi			20	32	1	!	48	- 2	1	1
per	<u>1</u>										
parts	Pot-	stum (K)									
ses, in	:	Sodium (Na)									
analy	Mag-	ne- sium (Mg)		7.3	3.7	ł	ł	8.0	7.3	1	1
mical	Cal-			51	18	1	1	20	41	1	!
Che	Мап-	ga- nese (Mn)									
		Fe)									
	Alu-	min (A1)									
		(SiO <sub>2</sub> )									
		of collection	Aug. 29, 1963	monthly)	Aug. 10 (mini- mum monthly).	Aug. 6 (max1mum 8/1-10)	Aug. 20 (max1- mum 8/11-20).	Sept. 17 (maxi- mum monthly).	Sept. 4 (mini- mum monthly).	Sept. 10 (maxi- mum 9/1-10).	Sept. 23 (maxi- mum 9/21-30).

84 82 80

63

KANAWHA RIVER BASIN--Continued

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

Aver-age

	L.,					
		31	3   8	35	12	8 1 1 1 1
		30	65 47 40	35	67 70 81	84 82 74
		29	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	410	67 07 80	85 82 75
			0 4 4 0 6 0	35	65	85 76
		27	0 4 4 0 0 0	35	6.5 80	85 85 81 82 76 76
		26	39	35	64 68 80	85 85 81 81 76 76
1963		25	39	36	65 78 78	85 85 81 81 76 76
er i		24	1200	36	65 65 68 67 77 78	85
temp		23	71 50 40	3.6 4.8 8.4	65 68 77	84 81 78
Sep1		22	500	38 37 48	61 63 70 70 77 77	84 84 80 81 79 79
to Se 7 0600		21	553	33	61 77	84 80 79
Temperature (°F) of water, water year October 1962 to September 1963 (Once-daily measurement at approximately 0600)		19 20 21 22 23 24 25 26 27 28	50	0 8 8	62 71 68	84 80 79
ina ina			70 52 39	38 37 47	61 72 76	48 08 08
tobe			71 51 39	36	60 72 76	83
ap)		17	72 50 39	0 8 4 0 0 0	60 71 75	82 80 80
(°F) of water, water year (Once-daily measurement at	Day	11 12 13 14 15 16 17 18	71 50 39	37	37.2	81 79 80
ter		15	71 51 40	99	60 70 75	81 79 80
wai		14	51	42 39 45	60 60 70 71 74 75	81 81 81
ter, mea		13	71 71 52 51 40 40	450	70	81
11y		12	71 50 41	1 6 7 2 0 9 4 0 0	99	81 80 83
) of		=	71 52 43	4 % 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	69 73	80 80 82
(°F)		10	6.53	33. 44.	60 61 68 69 70 72	8 3 3 3 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
ıre (		6	73 73 55 55 44 44	37	68 70	8 8 8 3 8 3
ratı		8	5.52	37	60 67 71	84 84 81
эшье		7	72 55 44	339	60 67 71	84 86 81
Ĭ		9	72 72 56 56 47 47	35	59 59 65 67 73 72	84 84 86 86 81 81
		5	72 72 56 56 47 47	500	59	84 86 81
		4	572	36	56 59 64 65 72 72	8 8 5 0 8 5
		3	72 54	39	56 64 72	86 85 81
		2	73 64 49	39 37 38	55 64 71	85 83 81
		-	44	3.5 3.5 3.5 3.5	54 67 70	8.5 8.5 8.1
	Moorb	1100000	October 73 November 64 December 47	January February March	April May	July August September

## OHIO RIVER MAIN STEM

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

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 male upstream from gaging station.

DRAINAGE AREA.—54.00 square mailes, approximately.

BRAINAGE AREA.—54.00 square mailes, approximately.

Water temperatures—Chemical analyte Soptember 1963.

Water temperatures—Chemical analyte Soptember 1963.

Water temperatures—Chemical analyte Soptember 1963. unpublished.

REMARKS.—Daily samples were collected at this station and records of specific conductance of daily samples are available in district office at Columbus, Ohio. Analyses were made on the maximum daily specific conductance for each work. Records of dasserved and minimum daily specific conductance for each month. Records of dasserved are given for Ohio River at Huntington.

	Organics Phe-Alkyl	Col- nois Den- or as Zene Céds Sulfo- OH nate (ABS)		0.0	Į.	ł	۲.	1	1	۲.	٦.	<u> </u>	1
		- - - -		₩.	6	10	10		-		_		
-	5 7	pa t	_	377 7.4	568 6.9	357 6.5	523 6.5	600 6.7	343 6.4	646 6.0	685 6.1	726 6.4	587 6.3
	To-Specific tal conduct-	acid- ance ity (micro- as mhos at H <sup>+1</sup> 25°C)		37	26	32			34	64	89	72	28
-		Non- it car- a bon- H		1	141	88	1	144	92	1	1	195	139
	Hardness as CaCO,		-	-	170	119		177	103	1	-	215	168
-		C) ciu	-	1	340 1	212 1	- 1	355 1	201 1		1	440 2	344 1
		solids (residue Cal- at 180°C) cium, mag- nesium											
1963	Phos-1	us as PO <sub>4</sub>		0.14		1	60.	1	1	.11	80.	;	ì
per 1	ż	ride trate (F) (NO <sub>3</sub> )		ł	7.2	8.8	1	5.2	4.8	1	}	8.0	5.7
Septen	Fluo-	ride (F)											
Chemical analyses, in parts per million, July to September 1963	:	(CI)		1	70	33	ł	99	32	1	!	98	89
1111on,	:	(SO.)		91	118	81	121	145	92	148	173	186	136
oer m		ate of				~		_	~				
rts	Bi-			1	36	38	!	40	32	!	\ 	22	36
in pa	Po-	tas- sium (K)											
alyses,	:	(Na)											
cal an	Mag-	sium (Mg)		1	11	7.6	1	11	6.1	1	1	14	10
Chemi	Cal-	clum (Ca)		1	50	35	1	53	31	-	ŀ	63	51
	Man-	ga- nese (Mn)											
		Fe)											
	Alu-	(A.1)											
	į	Silica mi- (SiO <sub>2</sub> ) num (Al)											
	Mean	discharge (cfs)		15500	14000	19700	11500	9670	7700	11400	9650	7420	11400
	Date	u o	July 6, 1963	weekly)	monthly)	monthly)	Aug. 15 (maximum weekly)	Aug. 29 (maximum monthly)	monthly)	Sept. 10(max1mum 9/1-10)	9/11-20)	monthly)	monthly)

## BIG SANDY RIVER BASIN

3-2093. RUSSELL FORK AT ELKHORN CITY, KY.

LOCATION. --Tomperature recorder at gaging station, 10 feet downstream from steel highway bridge on State Highway 80, at Elkhorn Creek.

DRINGE AREA. --564 square miles.

BRICORDS AFALLABLE. --Water temperatures: July 1961, 104 okugust 1963.

EXTREMES, 1962-63. --Water temperatures: Miniamm, freezing point Jan. 11-13.

EXTREMES, 1961-63 (revenoratures: Miniamm, freezing point Jan. 11-13.

EXTREMES, 1962-63. --Water temperatures: Maximum, 82°F Aug. 19-21, Sept. 3, 1962; miniamm, freezing point Jan. 9, 22, 1862, Jan. 11-13, 1963, Jan. 11-13, 1963, Jan. 11-13, 1963, Jan. 11-13, 1963.

Temperature (°F) of water, November 1962 to August 1963 (Continuous ethyl alcohol-actuated thermograph)

	Aver-	age		8 S	35	37		57	1.1	11	77	1.1
L	¥										97	11
		31	11	34	38	11	6 4 4	11	11	11		
		30	3 3	9,4	38	1 1	4 4 6 8	5.6	11	75	7.3	11
		29	1 1	4.0	3.9	1	4 4 8 3	69	11	-1-1	80	11
		28	11	3.4	3.8	37	4 4	909	1	75	85	11
		27	11	3.4	36	36	4 4 8 6	60		75	90	11
		26	1.1	34	38	36	4 6	09	11	75	79	11
		25	11	34	3.9	36	64	09	11	75	79	
		24	11	33	36	37	52	09	1-1	75	79	11
		23		34	6 W	39	48	69	11	75	79	11
		22	11	333	36	39	4 t	59	11	75	79	11
a Du		21	1 '	20	61.60	37	6 4 6	V 10	1-1	75	77	1.1
98		20	11	3.4	44	3.6	11	9.0	11	75	79	1.1
alconol-actuated thermograph		61	11	7 1	9.6	36	11	50.0	11	11	980	11
1		81	11	3 7 7	36	36	11	66	11	11	93	1.1
are		17	1.1	K 4	37	3.8	11	9 9	11	1 1	78	1-1
100	Day	91	11	3.5	3.7	2 8 8	1.1	5.0	11	11	76	1 1
	_	15	H	1.6	1.0	3.6	11	44	11	1.1	76	1-1
001		14	11	20 %	3.6	3.6	11	4 4 5	11	11	7.5	11
7d		13	11	3 h	3 24	4. 4	1 1	44	1 1	11	75	11
etuyı		12	11	1- 4	6.0	4 5	1.1	5.00	1.1	1.1	75	1 1
		=	1.1	÷ ÷	6.6	2 5 5	1 1	5.4	1 (	11	75	11
Ing.		01	11	34	4 6.	3.5	1.1	4 4	1 1	11	75	11
Continuous		6	111	34	3.4	4.5	11	5.4	11	1-1	75	11
2		8	1 1 1	7.5	34	3.5	1.1	34	11	1.1	27.	11
	1	7	1.1	7.5	4.5	7 7	11	2 7	11	11	7.5	16
١		9	11	75	4.5	3.5	1.1	5.4	11	11	7.5	7.6
		2	11	3.6	3.6	9 7	46	54	11	11	t- t- m m	72
		4	11	36	3.6	37	666	7 t	11		4.4	7.9
		3	11	3.5	7.6	3 3	200	7.7	11	1 !	7.5	7.9
		2	11	36	3.8	3.6	C 4 C 7	4 4	61	1.1	75	7.0
		_	11	0.5	36	3.6	4 k	4 0	0.6	1.1	7.5	79
			: :	11	: :	; ;	::	::	11	- ; ;	1:	11
	Manak	MORE		December Maximum Minimum	EΞ	mum mum	March Maximum Minimum	ntmum xtmum	Kimum	June Maximum Minimum	mum	August Maxımum Minimum

## BIG SANDY RIVER BASIN---Continued

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

LOCATION.--Temperature recorder at gaging station, 100 feet upstream from Long Branch, 0.3 mile upstream from Daniels Creek, 0.7 mile downstream from Dowey Dam, and 2.5 miles southeast of Van Lear, Johnson County.

DRAINAGE AREA,--206 square miles.

RECORDS ANALIABLE.--Water temperatures: April 1964 to September 1963.

EXTREMES, 1962-63.--Water temperatures: Maximum, 74°F Sept. 12; minimum, freezing point Dec. 21, 22, Jan. 5, 9, 10, 12, 18.

EXTREMES, 1963-63.--Water temperatures: Maximum, 90°F July 3, 1956; minimum, freezing point on several days during December 186MARS.--Zlow regulated by Dewey Reservoir.

Temperature (°F) of water, water year October 1962 to September 1963

	Aver-	27 28 29 30 31 age	60 59 60 60 60 62 5) 59 49 60 60 61	44 42 42 42 50	36 37 42 37 37 33 34 34 26 35 36 36		36 38 39	51 51 56 53 53 47	25 25 25 25 25 25 25 25 25 25 25 25 25 2	57 57 57 58 54 54 54	67 67 67 67 61 67 05 77 57 60	66 57 67 57 66 67 67 66 69 69 69	08 69 08 6c 60 6d 07 67 67 66 66 56	64 63 60 60 67
		25 26	62 61 61 60	46 46	37 36	11	41 37 36	50 51	55 55	5 G G	67 60 67	66 66	64 54 67 67	67 65
		24	63 62	4 B 4 4 4 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	36 37	40 37 34 35	41 37	50 50	57 56	59 50 58 50	61 61 60 60	99999	66 68	68 68
hermograph)		22 23	63 6	47 4	32.4	34	38 3	51 54	5.5	0.00	61 6	667	68 6	69 67
raph)		21	63	2,4	45	344	35	5.00	200	0.00	9 6	200	99	2 4
thermograph		19 20	65 64	48 48	35 35	32 33	35 35	51 51	56 57	54 54	61 61 60	67 67	67 66	64
		17 18	65 65	51 43	35 34	35 34	38 38	49 50	54 56	58 58	60 60	67 67	68 68	69 69
(Continuous ethyl alcohol-actuated	Day	16	6.5	2 2 2	D 0°	2 K	38	3 d 3 d	5 5	58	99	99	99	6.9
alcohol-actuated		14 15	64 65	44 47 448	17 27 14 15	37 40	42 4n 36 37	42 44	54 55	58 58	900	99 99	68 64 66 66	68 64
ıs ethyla.		13	63	7 7	338	9 E	0 4 6	4 4 6 6	4 4	5,08	100	66 65	68	68
us et		11 12	62 62 61 62	50 51	42 38	4 6 6	38 4.)	47 46	54 54 54 54	59 58	62 61	99 99	68 66 66 66	69 74
tinuo		10	61 61	50 50 44 48	38 37	33 35	39 42	47 47	54 54 54	57 58 57 57	59 60	66 66	60 69 56 66	68 6 2
CO)		6 8	60 6	1.04	34 3	. e.	10 3	4 4 6 4	2 4 4 5 5 5	56 5	5.00	66 69	68 6	68 6
(Continuo		2 9	9	2 4 5 30	3.0	90 %	37	4 4 4 1	50 0	200	53	67	65	9 68
		2	09 09 09 09	58 56 55 52	47 44	33 33	39 40	42 43	54 53	58 56	59 59	68 68 68 67	67 67 66 66	67 68
		3 4	09 09	59 59	42 42	35 35	38 38 34 34	39 42	53 54	55 63	59 59	68 68 68	69 63	67 67
		2	09 09	960	4 4	3.5	4136	37	10 th	55	5.9	68	66	67
			m 6	m 60	n	m n	m 36	m a	n 53	m 56	m 59	m 68	m 68	m 68
	Month	MOIII	October Maximum Minimum	Maximum Minimum	December Maxımum Mınimum	January Maximum Minimum	Maximum Minimum	Maximum Minimum	April Maximum Minimum	May Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum

## 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 up-DRAINAGE AREA. -- 2,143 square miles. stream from gaging station.

RECOIDS AVAILED I.—Chemical analyses: October 1984 to March 1953, November 1960, to September 1961.

Water temperatures: October 1983 to Warch 1953, November 1960 to September 1963.

Water temperatures: March 1953, November 1960 to September 1963.

Water temperatures: March 1953, October 1960 to September 1963.

EXTREMES: 1962-65.—Water remperatures: March 1953, October 1960 to September 1963.

Water to September to Control of September 1960, January 1961 to September 1963.

September to Control of September 1960, January 1961 to September 1963, January 1961 to September 1963, January 1961 to September 1963, January 1961 to September 1963; March 1963; March 1963.

German to Control of September 1960, January 1961 to September 1963; March 1963; March 1963, January 1961 to September 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1963; March 1964 to September 1960, January 1961 to September 1964, January 1961 to September 1964, January 1961 to September 1964, January 1961 to September 1964, January 1961 to September 1965; March 1963; March 1963; March 1963, March 1963, March 1963; March 1963; March 1963; March 1963; March 1964 to September 1964 to September 1964 to September 1964 to September 1965; March 1964 to September 19

REMARKS.--No temperature record Dec. 27 to Feb. 4. Flow slightly regulated by Dewey Reservoir. Flow affected by ice Dec. 12-17,

19
September
2
1962
October
year
water
water,
of
( °F)
Temperature

963

															ı	Day																Aver-
Month	_	~	е	4	2	9	7	80	٥	0.	=	12	13	4	15	161	17	8	61	20	21	22	23 ;	24	25	26 2	27 2	28 2	29	30	31	age
October November	70 62 40	74 60 42	74 56 42	74 58 42	75	75 54 38	75 50 38	75 48 36	75 46 36	74 44 35	344	76 43 32	75 42 6	75	75	34	343	73	74 444 36	73 42 36	72 4.1 37	72	72 72 42 42 42	7 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	400	6 4 4 6 5 5	9 79	901	42 4	4041	711	72 46 38
January February	1 1 4	119	112	115	1 4 9	1 0 4	1 1 %	9	100	141	1 2 3	39	335	183	121	35	191	32	1 6 6	512	1.89	4 1 1 4 5	1 80 7	1 2 1	1 00 1	1 8 3	1 4 0	100	111	119	1 1 2	110
April May. June	66 65 72	70 66 75	70	62 69 72	22 22	60 71 80	61 73 79	60 72 80	60 75 85	58 86	58.0	4 6 8 4 8 8 4	208	55 74 81	717	27.5	76 78 78 8	68 75 80	45	68 76 78	752	73	122	61 75	965	68 7.0 8.3	68 72 83 7	65 65 79	0 0 0 0	60 72 85	121	64 71 79
JulyAugust	33 85	85 78 78	85	62 82 78	83 78	75	7 80	78	76	75 80 77	79	80 78 78	78	80 75 75	122	83	78	86 78	7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	80 75	81 80 80 80 70 70		81	82 81 78	85	78	89 84 80 81 70 65		81 62 99	82 76 68	145	82 79 74

## QUALITY OF SURFACE WATERS, 1963

## BIG SANDY RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963
(Where no concentrations are reported, loads are estimated)

1		OCTOBER	:		NOVEMBE	R		CECEMBER	
Γ		Suspend	led sediment		Suspen	ded sediment		Suspen	ded sedimen
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
	104	22	12	4.5.0		240	1020	37	102
2	196 170	22 16	12 7	458 2010		1200	874	13	31
3	155	13	5	2300		300	742	10	20
4	147	18	7	2200	16	95	655	5	9
5	133	22	8	2080	11	62	635	12	20
6	122	19	6	641		220	826	9	20
7	117		7	316		95	1320	8	28
8	167	22 17	8	284	2.7	21	1720	26	121
9	184	27	13	330	29	26	1630	20	88
10	161	17	7	2270		1500	1560	26	110
11	138	20	7	9910	616	16500	1460	3 6	118
12	120	6	2	8250	546	S 13100	1050	25	71
13	115	8	2	3140 1830	225 180	1910 889	860 700	13	30 11
14	117 181	6 4	2	1830	160	540	800	10	22
16	147	9	4	952	155	398	900	10	24
17	128	. 8	3	766	188	389	1000	9	24 17
18	144 193	13 15	5 8	784 1480	175 156	370 623	1180	6 14	45
20	167	20	9	1870	124	626	1300	8	28
						3		909	5 15800
21	147 128	36 45	14 16	1740 3600	31 325	146 S 3610	4750 8820	909 650	S 15800 B 16000
23	128	45	16	6970	1060	20000	9430	295	7510
24	120	13	4	6640	800	B 14000	6790	397	7280
25	270	16	12	3550	410	3930	3780	93	949
26	280	8	6	2350	167	1060	3350	46	416
27	260	6	4	1940	39	204	4110	81	899
28	210	5	3	1580	4.5	192	5660		2200
29	180	7	3	1340	23	8.3	5530		1500
30	160 150	6 5	2	1170	17	54	6150 9250		5500 9500
Total	5032		204	74 0 0 1		82483	88922		68493
Otal	9092			74001			00722	MARCH	00473
		JANUARY			FEBRUAR				
1	7090		2600	2540		210	3350	123	1110
2 • •	4520		1000	2880		500	4380	200	2360
3	3040 3560		470 260	8150 13300		23000 18000	6750 6890	382 260	696U 484U
5	2110		170	10200	293	8070	7930	421	S 9760
- 1									
6	1820		150	5470	195	2880	18800	2720	5 138000
7	1640 1510		150 140	4260 3480	114	1310 864	30100 27900	2060 725	167000 S 57600
9	1440		120	2850	74	569	12000	360	11700
10	1350		120	2340	60	379	697∪	320	6020
11	1340		120	2580	61	425	9010	743	18100
12	2650		700	4926	107	1420	29800	3360	5 289000
13	5930		4300	5530	145	216∪	51000	2920	402000
14	6910		3200	4690	106	1340	51900	971	136000
15	5360		1600	3650	4.5	443	28700	600	46500
16	3900		840	2840	50	383	11600	650	∠0400
17	3030		550	2700	23	168	13700	1980	S 61800
18	2620		400	2540	33	226	28800	2170	169000
19	2440 2260	1	330 270	2790 3660	76 210	572 2080	28700 16500	490 330	S 39800 14700
							ı		
21	2290		260	6190	320	5350	9090	340	8340
22	2570 2370		290 240	8340 5740	374 245	842U 3800	688U 269U	24U 207	4460 3180
23	2100		160	4480	95	1150	7100	217	4160
25	2050		170	3950	62	661	6600	221	3940
- 1	2210		180	3400	5.8	532	6260	213	3600
26	2210 3100		180 800	3400	60	532	6050	213	3270
28	3230		490	3310	63	563	4950	150	2000
29	2340		170	3310		1	2410	71	462
30	1970		130				2040	70	386
	2120	1	150				1810	56	274
31	2120	+						+-	

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

## BIG SANDY RIVER BASIN -- Continued

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

Suspended sediment, water year October 1962 to September 1963--Continued (Where no concentrations are reported, loads are estimated)

		APRIL	ded sediment	<del>                                     </del>	MAY	dad aad:	+	JUNE	المام	nadi
_	Mean		ded sediment	Mean	Suspen	ded sediment	Mean	Suspen	ded a	sedimei
Day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)		Tons per day
1	1670	52	234	448	2	2	2560	280		1940
2	1560	40	168	555	1	1	2000	97		524
3	1460	35	138	505	1	2	1500	51		206
4 • •	1340	30	108	496	1	1	1250	33		111
5	1250	20	68	452	1	1	1100	35	ĺ	104
6	1160	16	50	420	1	1	970	25		65
7	1090	16	47	406	2	2	900	30		7:
8	1060	15	43	382	2	2	2000	26		14
9••	1070	15	4.3	368	] 3	3	1600	1 164	5	378
0	1020	12	33	350	1	1	1200	177		57
1	958	15	39	333	2	2	780	175		368
2	886	10	24	314	2	2	620	8∪		134
3	800	8	17	317	10	8	500	3.5		47
4	760	7	14	371	6	6	450	25		31
5 • •	712	6	12	354	3	3	420	2.3		26
6	660	5	9	354	2	2	410	20		22
7	630	5	8	35∪		13	400	14		15
8	585	2	3	820	220	A 490	390	16		1 1
9••	565	3	4	940	68	172	440	20	s	24
0	575	2	3	946	27	69	420	184	15	99
1	540	5	7	706	15	28	680	426		782
2	527	6	8	57∪	4	6	500	366		494
3	555	5	7	496	4	5	365	148	ļ	154
4	565	1	2	432	4	5	330	86	1	7
5	519	1	1	403	7	8	300	54	1	44
6	500	1	1	368	8	8	285	27		2
7	456	2		357	9	9	250	25		17
8	417	6	2 7	2000	1280	5 13500	225	21		1:
9	406	3	3	3600	1240	5 15000	244	16	1	10
0	417	2	2	281∪ 4270	281 674	S 2600 7770	231	12		
-					+					
otal	24713		1105	25583		39722	23340			7407
		JULY			AUGUST			SEPTEMBE	R	
1	307	15	12	266	26	19	122	23		8
2	537	44	5 89	700	7.2	136	1∪5	15	1	4
			216	736	252 242	501 274	98 119	23	ļ	6
	890	90								223
4	537	145	210 153	420 288	127	99			S	
4	537 371	145 153	153	288	127	99	452	104	5	
3 4 5	537 371 282	145 153 388	153 295	288	127	99 40	452 1290	104	5	1760
5 6 7	537 371 282 244	145 153 388 280	153 295 184	288 228 192	127 65 54	99 40 28	452 1290 690	504 388	S	1760
6 7 8	537 371 282 244 311	145 153 388 280 124	153 295 184 104	288 228 192 183	127 65 54 55	99 40 28 27	1290 690 409	104 504 388 260	5	1760 723 281
4 5 6 7 8	537 371 282 244	145 153 388 280	153 295 184	288 228 192	127 65 54	99 40 28	452 1290 690	504 388	5	1760 723 287
6 7 8 9	537 371 282 244 311 575 399	145 153 388 280 124 117 276	153 295 184 104 182 297	288 228 192 183 225 317	127 65 54 55 45 150	99 40 28 27 27 128	1290 690 409 295 241	504 388 260 137 72	5	1760 723 281 109 41
4 5 6 7 8 9 0	537 371 282 244 311 575 399	145 153 388 280 124 117 276	153 295 184 104 182 297	288 228 192 183 225 317	127 65 54 55 45 150	99 40 28 27 27 128	1290 690 409 295 241 201	504 388 260 137 72 52	S	1760 723 287 109 47
4 5 6 7 8 9 0	537 371 282 244 311 575 399 307 285	145 153 388 280 124 117 276	153 295 184 104 182 297 114 54	288 228 192 183 225 317 500 409	127 65 54 55 45 150 140 350	99 40 28 27 27 128 189 386	1290 690 409 295 241 201 169	504 388 260 137 72 52 85	S	1760 722 281 109 41
4 5 6 7 8 9 0	537 371 282 244 311 575 399 307 285 228	145 153 388 280 124 117 276 137 70 42	153 295 184 104 182 297 114 54 26	288 228 192 183 225 317 500 409 343	127 65 54 55 45 150 140 350 354	99 40 28 27 27 128 189 386 326	1290 690 409 295 241 201 169 204	104 504 388 260 137 72 52 85	5	1766 723 281 109 41
4 5 7 8 9 0 1 2 3	537 371 282 244 311 575 399 307 285	145 153 388 280 124 117 276	153 295 184 104 182 297 114 54	288 228 192 183 225 317 500 409	127 65 54 55 45 150 140 350	99 40 28 27 27 128 189 386	1290 690 409 295 241 201 169	504 388 260 137 72 52 85	5	1760 72: 28: 10: 4: 28: 3: 5:
4 5 6 7 8 9 0 1 2 3 4 5	537 371 282 244 311 575 399 307 285 228 201 186	145 153 388 280 124 117 276 137 70 42 41 32	153 295 184 104 182 297 114 54 26 22 16	288 228 192 183 225 317 500 409 343 279 244	127 65 54 55 45 150 140 350 354 302 352	99 40 28 27 27 128 189 386 326 227 232	1290 690 409 295 241 201 169 204 204 228	104 504 388 260 137 72 52 85 100 118 74	5	1760 723 281 109 41
4 6 7 8 9 0 1 2 3 4 5	537 371 282 244 311 575 399 307 285 228 201 186	145 153 388 280 124 117 276 137 70 42 41 32	153 295 164 104 182 297 114 54 26 22 16	288 228 192 183 225 317 500 409 343 279 244	127 65 54 55 45 150 140 350 354 302 352	99 40 28 27 27 128 189 386 326 227 232	1290 690 409 295 241 201 169 204 204 204 228	104 504 388 260 137 72 52 85 100 118 74	5	1769 722 28 109 4 28 33 55 65
4 5 6 7 8 9 0 1 2 3 4 5	537 371 282 244 311 575 399 307 285 228 201 186	145 153 388 280 124 117 276 137 70 42 41 32 27 26	153 295 164 104 162 297 114 54 26 22 16	288 228 192 183 225 317 500 409 343 279 244 301 320	127 65 54 55 45 150 140 350 354 302 352 163	99 40 28 27 27 128 189 386 328 227 232	1290 690 409 295 241 201 169 204 204 228 216	104 504 388 260 137 72 52 85 100 118 74 47	5	1766 722 28 109 4 28 33 55 65 46
4 5 6 7 8 9 0 1 23 4 55 6 7 8	537 371 282 244 311 575 399 307 285 228 201 186	145 153 388 280 124 117 276 137 70 42 41 32	153 295 164 104 182 297 114 54 26 22 16	288 228 192 183 225 317 500 409 343 279 244	127 65 54 55 45 150 140 350 354 352 163 85 63	99 40 28 27 27 128 189 386 326 227 232	1290 690 409 295 241 201 169 204 204 204 228	104 504 388 260 137 72 52 85 100 118 74	5	1766 723 287 105 47 28 39 55 65
4 5 6 7 8 9 0 1 23 4 5 6 7 8 9 9 9 9 9 9	537 371 282 244 311 575 399 307 285 228 201 186	145 153 388 280 124 117 276 137 70 42 41 32 27 26 20	153 295 184 104 1104 297 114 54 26 22 16 13 12 8	288 192 183 225 317 500 409 343 279 244 301 320 247	127 65 54 55 45 150 140 350 354 302 352 163 85 63	99 40 28 27 128 189 386 326 227 232 132 73	1290 690 409 295 241 169 204 204 228 216 175 146	104 504 388 260 137 72 52 85 100 118 74 47 37	5	1766 723 287 109 4: 28 39 55 55 46 27
4 6 7 88 99 1 22 33 44 55 66 77 88 99 99 100 1	537 371 282 244 311 575 399 307 285 228 201 186 177 169 153 143 144	145 153 388 280 124 117 276 137 70 42 41 132 27 26 20 20 25	153 295 184 104 102 297 114 26 22 16 13 12 8	288 192 183 225 317 500 409 343 279 244 1320 247 210 201	127 65 54 55 45 150 350 354 302 163 85 63 65 75	99 40 28 27 128 189 386 227 232 132 73 42 37 41	1290 690 409 295 241 201 169 204 204 228 216 175 146 122 108	104 504 388 260 137 72 52 85 100 118 47 37 47 37 32 29 23	5	1760 723 287 109 47 28 335 55 65 46
4 6 7 89 00 1 22 33 44 66 77 88 99 00	537 371 282 244 311 575 399 307 285 201 186 177 169 153 143	145 153 388 280 124 117 276 137 70 42 24 41 32 27 26 20 20 25	153 295 184 104 182 297 114 54 26 22 16 13 12 8 8	288 228 192 183 225 317 500 409 343 279 244 301 320 247 210 201	127 65 54 55 45 150 140 350 354 302 352 163 65 65 65	99 40 28 27 128 189 386 326 227 232 132 73 42 37 41	1290 690 409 295 241 201 169 204 204 228 216 175 146 122 108	504 388 266 260 137 72 52 85 100 118 74 47 37 32 29 23	5	1760 723 285 109 45 28 39 55 65 46
4 5 6 7 89 1 22 33 66 77 88 99 11 12 13 14	537 371 282 244 311 575 399 307 285 228 201 186 177 169 153 143 144 172	145 153 388 280 124 117 276 137 70 42 41 132 27 26 20 20 25	153 295 184 104 102 297 114 26 22 16 13 12 8	288 228 192 183 225 317 500 409 343 279 244 320 247 210 201 169 157	127 65 54 55 45 150 350 354 302 163 85 63 65 75	99 40 28 27 128 189 386 227 232 132 73 42 37 41	452 1290 409 295 241 201 169 204 204 228 216 175 146 122 108	104 504 388 260 137 72 52 85 100 118 47 37 47 37 32 29 23	5	1760 723 285 109 4 28 39 55 55 55 56 100 111 111 111 111 111 111 111 111 11
4 6 77 88 99 00 1 23 44 55 66 78 99 11 12 13 14 14 15 16	537 371 282 244 311 575 399 307 285 201 186 177 169 153 143	145 153 388 280 124 117 276 137 70 42 41 32 27 26 20 20 20 25 24	153 295 184 104 102 297 114 26 22 16 13 12 8 10	288 228 192 183 225 317 500 409 343 279 244 301 320 247 210 201	127 65 54 55 45 150 140 350 354 302 352 163 85 65 75	99 40 28 27 128 189 386 227 232 132 73 42 37 41 30 19	1290 690 409 295 241 201 169 204 204 228 216 175 146 122 108	504 388 266 137 72 52 85 100 118 74 47 37 32 29 23	5	1760 723 287 109 47 28 39 55 65 46 27 17 12
4 5 6 77 8 99 00 11 23 44 11 12 13 14 14 15 16 16 17 17 18	537 371 282 244 311 575 399 307 285 201 186 177 169 153 143 144 172 190 200	145 153 388 280 124 117 276 137 70 42 241 32 27 26 20 20 20 25 24 22 25	153 295 184 104 182 297 114 54 26 22 16 13 12 8 8 10	288 228 192 183 225 317 500 409 343 279 244 301 320 247 210 201 169 157 141	127 65 54 55 45 150 140 350 354 332 352 163 85 63 65 65 45	99 40 28 27 128 189 386 326 227 232 132 73 42 37 41 30 19 11	452 1290 690 409 295 241 201 169 204 228 216 175 146 122 108 88 88 76	104 368 266 137 72 52 85 100 118 74 47 37 32 29 9 23	5	1760 723 287 109 47 28 39 55 65 46 27 17 12
4 5 6 7 88 99 1 1 22 34 1 66 78 1	537 371 282 244 311 575 399 285 228 201 186 177 169 153 143 146 172 190 220 250	145 153 388 280 124 117 276 137 70 42 41 32 20 20 20 25 25 25 23 19	153 295 184 104 106 182 297 114 54 26 22 16 13 12 8 10 11 11 14 14	288 228 192 183 225 317 500 409 343 279 244 301 320 247 210 201 169 157 141 177 219	127 65 54 45 150 140 350 354 302 352 163 85 63 65 75 45 28 28	99  40 28 27 27 128 189 386 326 227 232 132 73 42 37 41 30 19 111 13 15	452 1290 409 295 241 201 169 204 228 216 175 146 122 108 88 76 70	504 368 260 137 72 52 85 100 118 74 47 37 32 29 23 20 23 22 24 20	5	1760 723 285 109 45 28 39 55 55 46
4 5 6 7 88 99 1	537 371 282 244 311 575 399 307 285 201 186 177 169 153 143 144 172 190 200 220 220 250 219	145 153 388 280 124 276 137 70 42 41 132 27 26 20 20 20 20 25 24 22 25 23 19	153 295 184 104 162 297 114 54 26 22 16 13 12 8 8 10	288 228 192 183 225 317 500 409 343 279 244 301 320 221 169 157 141 177 219	127 65 54 55 45 150 1350 354 302 352 163 85 65 75 65 45 28 28	99 40 28 27 128 189 386 326 327 232 132 73 41 30 19 11 13 15	452 1290 690 409 295 241 201 169 204 204 228 216 175 146 122 108 88 76 70 65	504 388 260 137 72 52 5100 110 74 47 37 32 29 20 23 22 24 20 20 20	5	1766 723 283 105 45 28 38 55 55 46 66 27 11 11 12 12 14 14 14 15 16 16 16 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18
4 5 6 7 8 90 1 23 44 1 1 23 1.	537 371 282 244 311 575 399 307 285 228 201 186 177 169 153 143 146 172 190 220 220 250 219	145 153 388 280 124 117 276 137 70 42 41 32 27 26 20 20 20 25 25 23 19	153 295 184 104 182 297 114 54 26 22 16 13 12 8 8 10 11 11 14 14 13	288 228 192 183 225 317 500 409 343 279 244 301 320 247 210 201 169 157 141 177 219 198 163	127 65 54 55 45 150 140 350 354 302 352 163 85 65 75 45 28 28 25	99 40 28 27 27 128 189 386 326 227 232 132 73 42 37 41 30 19 11 13 15 11	452 1290 409 409 295 241 201 169 204 228 216 175 146 122 108 88 76 70 65	504 508 388 26c 137 72 52 85 100 11s 74 47 37 32 29 23 20 22 24 20 20 16	5	1766 722 281 103 461 28 33 55 46 27 111 101
4 5 6 7 8 90 1 23 1 23 1 23 1 24 1 25 1 26 27 28	537 371 282 244 311 575 399 307 285 201 186 177 169 153 143 144 172 190 200 250 250 219 183 160	145 153 388 280 124 276 137 70 42 41 132 27 26 20 20 20 25 25 24 22 25 23 19	153 295 184 104 162 297 114 54 26 22 16 13 12 8 8 10	288 228 192 183 225 317 500 409 343 327 244 301 301 301 301 169 157 141 177 219 198 163 141	127 65 54 55 150 150 350 354 302 352 163 85 57 75 65 45 28 28 28 20 19	99 40 28 27 128 189 386 326 327 232 132 73 41 30 19 11 13 15	452 1290 690 409 295 241 201 169 204 204 228 216 175 146 122 108 88 76 70 65	504 388 260 137 72 52 5100 110 74 47 37 32 29 20 23 22 24 20 20 20	5	1766 723 283 105 45 28 38 55 55 46 66 27 11 11 12 12 14 14 14 15 16 16 16 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18
4 5 6 7 88 99 1	537 371 282 244 311 575 399 307 285 228 201 186 177 169 153 143 146 200 220 220 250 219 183 160	145 153 388 280 124 117 276 41 32 41 32 26 20 20 20 20 22 25 23 19	153 295 184 104 182 297 114 26 22 16 13 12 8 8 10	288 228 192 183 225 317 500 409 343 279 244 301 320 247 210 201 169 157 177 219 198 163 141 149	127 65 54 55 150 150 350 352 352 163 85 53 65 75 65 28 28 28 20 19 18	99 40 28 27 128 189 386 326 327 232 132 42 37 41 30 19 11 15 11 8 7	295 295 295 241 169 204 228 216 2175 1175 146 122 108 88 88 76 70 65	504 388 260 137 72 52 85 100 110 74 47 37 77 22 29 23 24 20 20 16 17	5	1760x772:28 1000x160x160x160x160x160x160x160x160x160
4 5 6 7 8 90 12 12 12 13 14 14 15 16 17 18	537 371 282 244 311 575 399 307 285 201 186 177 169 153 143 144 172 190 200 250 250 219 183 160	145 153 388 280 124 276 137 70 42 41 132 27 26 20 20 20 25 25 24 22 25 23 19	153 295 184 104 182 297 114 54 26 22 16 13 12 8 8 10 11 11 14 14 13	288 228 192 183 225 317 500 409 343 327 244 301 301 301 301 169 157 141 177 219 198 163 141	127 65 54 95 150 140 350 350 352 352 163 85 63 3 65 75 65 75 20 19 18 20	99 40 28 27 27 128 189 386 326 227 232 132 73 42 37 41 30 19 11 13 15 11 8 7 8	1290 690 409 295 241 201 169 204 204 228 216 175 146 122 108 88 87 67 70 65	504 388 260 137 72 52 85 100 118 74 47 32 29 23 20 23 22 24 20 20 16 17 16	5	1766 723 283 109 4- 28 39 55 65 66 27 17 12 12 14 14 14 14 14 14 14 14 14 14 14 14 14
4 5 6 77 88 90 12 12 12 12 12 12 13 14 14 15 16	537 371 282 244 311 575 399 307 285 228 201 186 177 169 153 143 144 172 190 220 250 219 183 160 146	145 153 388 280 124 117 276 137 70 42 41 132 27 26 20 20 20 25 25 25 25 27 26 20 20 21 21 21 21 21 21 21 21 21 21 21 21 21	153 295 184 104 182 297 114 26 22 16 13 12 8 10 11 11 11 14 14 13	288 228 192 183 225 317 500 409 343 327 244 301 301 301 169 157 141 177 219 198 163 144 149 169	127 65 54 55 150 150 350 352 352 163 85 53 65 75 65 28 28 28 20 19 18	99 40 26 27 128 189 386 326 327 232 132 42 37 41 30 19 111 13 15 111 8 7 8 10	1290 409 295 241 201 169 204 228 216 175 146 122 108 88 88 76 70 65	504 388 260 137 72 52 85 100 110 74 47 32 29 23 24 24 20 16 17 16 16	5	1760/7 72:28'8' 100'10'10'10'10'10'10'10'10'10'10'10'10'
4 77 89 90 11 22 34 66 77 88 99 66 77 88 99 66 77 88 99.	537 371 282 244 311 575 399 307 285 201 186 177 169 153 143 146 190 200 220 250 219 183 160 146 143 163	145 153 388 280 124 117 276 41 32 27 26 20 20 20 20 20 22 25 25 25 23 19	153 295 184 104 182 297 114 26 22 16 13 12 8 8 10 11 11 14 14 13 9 7 7 9 7 8 8	288 228 192 183 225 317 500 409 3433 279 244 301 3201 201 169 157 141 177 219 198 163 1641 149 169 149	127 65 54 55 150 140 350 352 352 163 85 65 75 65 45 28 28 25 20 19 9 18 21 22 27	99 40 28 27 128 189 386 326 227 232 132 75 42 37 41 30 19 11 13 15 11 8 7 8 10 11 2658	1290 690 409 295 241 201 169 204 228 216 175 146 122 108 98 88 76 70 65	504 388 260 137 72 52 85 100 118 74 47 37 32 29 23 22 24 20 16 16 16 16		17617 1762 1762 1762 1762 1762 1762 1762

BIG SANDY RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visnal accumulation tube; W, in distilled water)

7	of of	analysis	SBWC	SBWC	SBWC	SBWC	SBN	SBWC	SBN	SBWC
		2,000								
		1.000								
	neters	002 0.004 0.008 0.016 0.031 0.062 0.125 0.250 0.500		1	ŀ	100	100	;	}	!
	Percent finer than size indicated, in millimeters	0.250	1	100	100	97	96	ł	1	1
diment	ated, 1	0.125	100	66	86	93	93	100	100	
Suspended sediment	se indic	0.062	66	86	96	6	88	86	86	100
Susper	than siz	0.031	86	94	92	87	82	97	86	66
	t finer	0.016	92	8	82	8	42	96	<b>8</b> 6	66
	Percen	0.008	75	65	89	72	29	92	97	66
		0.004	26	49	20	62	49	93	95	86
		0.002	41	34	34	49	32	83	83	84
Sediment	discharge	(tons per day)								
Sediment	concen- tration	(mdd)	554	3110	3190	833	833	512	512	428
	Discharge (cfs)	,	8470	30500	20600	53100	53100	265	265	388
Water	per-	(°F)								
1	ling per-	pount								
	Time (24 hour)		1200	1100	1000	1230	1230	1800	1800	1800
	Date of collection		Nov. 12, 1962	Mar. 12, 1963	Mar. 13	Mar. 14	Mar. 14	July 6	July 6	Aug. 12

BIG SANDY RIVER BASIN

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

LOCATION.--At city waterplant, at Kermit, Mingo County, 0.8 mile downstream from Wolf Creek, and 3 miles downstream from gaging station mear Kermit.

BARINGE AREA.--1.274 square miles at water plant; 1,185 square miles at gaging station.

BARINGE AREA.--1.274 square miles at water plant; 1,185 square miles at gaging station.

EXTREMES, 1962-63.--Water temperatures: Maximum, 82\*F July 28; minimum, 34\*P Dec. 11, 13.

EXTREMES, 1963-6-63.--Water temperatures: Maximum, 90\*F July 29; minimum, 17eezing point on many days during winter months.

	Aver-	age		_ 0 _		<b>7</b> 10 0
	_		63 52 42	41 42 51	61 68 74	77 76 70
		3	55	37	99	57
		30	56 48 49	38138	62 67 80	78 75 62
		29	54 49 48	38	64 63 79	80 77 64
		28	4 4 4 6 6 9	37 44 55	67 66 78	82 75 64
		27	444	8 4 7 3 5 5	64 68 79	80 75 63
į		26	44 44 44	37 40 55	62 63 77	78 78 62
		25	44 44 44	37 42 52	67 76	78 74 58
1963		24	50 51 46	38 47	62 64 76	77 78 77 76 64 60
ber		23	53 52 47	45 39 46	69 64 70	77 77 64
1962 to September		14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	0 4 4	42 38 47	6.8 6.9 6.9	77 76 57
Ser		21	64 50 41	44400	66 67 71	76 74 74
to		20	52	44 55	67 17 76	79 76 71
1962		19	53	45 54	49	81 74 72
er		18	76 56 38	33	57 72 72	80 75 72
top		17	74 76 54 56 38 38	38	56 57 70 72 70 72	78 80 72 75 74 72
ī.	Day	16	72 54 37	30	55 70 74	77 76 72
yea		15	71 50 38	4 to 12 to 1	54 68 76	77 77 70 76 67 72
ter		14	71 56 35	48 39 50	55 67 74	76 74 68
, we		13	69 57 34	52 46 51	57 67 74	75 78 75
water, water year October		11 12 13	67 54 38	4 4 0 0 0 0	552	74 76 75
		=	55 34	84 45 50	73	74 77 73
F of		10	68 54 38	9 4 4 4 6 4 7 9 4 9 4 9 4 9 9 9 9 9 9 9 9 9 9 9 9	73	72 78 74
		٥	72 53 41	4 4 4 6 8 8	73	74 77 73
Temperature		æ	70 52 42	447	58 70 73	76 77 77
nper		7	480	4 4 4 4 4 4 4 4 4	58 68 75	73 76 75
Tei		9	65 50 46	4 4 4 9 8 6	57 67 72	75 76 76
		5	67 52 50	0 4 4 4 8 8	62 68 70	75 75 78 76 75 76
		4	68 57 47	39	66 66 72	77 81 76
		က	50 40 40 40 40	6 4 4 5 7 7 0	66 66 73	77 77 78 81 74 76
		7	000 000 000 000 000 000 000 000 000 00	338	67 64 70	75
		-	64 56 47	434	64	81 75 79 79 72 74
	7	MOINT	October November December	January February March	April May	JulyAugust

## BIG SANDY RIVER BASIN---Continued

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

LOCATION. --At the Catlettsburg, Kenova, and Ceredo Water Company intake at Catlettsburg, Boyd County, 300 feet upstream from bridge on U.S. Highway 60, 0.3 mile upstream from Ice Dam Creek, and 0.9 mile upstream from mouth.

DRAINAGE AREA. -- 4,281 square miles, approximately.

EXTREMES, October 1962 to June 1963. --Dissolved solids: Maximum, 415 ppm Oct. 1-31; minimum, 101 ppm Mar. 1, 5-30. RECORDS AVAILABLE, -- Chemical analyses: October 1956 to June 1963 (discontinued). Water temperatures: October 1956 to June 1963 (discontinued).

Hardness: Maximum, 182 ppm Oct. 1-31; minimum, 56 ppm Mar. 1, 5-30,
Specific conductance: Maximum daily, 769 micronabos Oct. 4; minimum daily, 111 micronabos Mar. 13.
Specific conductance: Maximum, 208 ppm Oct. 2-31, 1858, minimum, 88 ppm May 1-9, 1958.
Hardness: Maximum, 208 ppm Oct. 2-10, 1958; minimum, 88 ppm May 1-9, 1958.
Specific conductance: Maximum daily, 876 micronabos Sept. 10, 1957; minimum daily, 86 micronabos Peb. 28, 1962.
Specific conductance: Maximum daily, 876 micronabos Sept. 10, 1957; minimum daily, 86 micronabos Peb. 28, 1962.
Rater temperatures: Maximum, 887 kug. 25, 26, 1959; minimum, freezing point on many days during winter months.
REMARKS.-Records of specific conductance and pii of daily samples available at Columbus, Onico. No discharge records available.

Color 펁 (microconduct-212 175 461 503 344 305 305 304 252 365 mhos at 180°C) magne-carbon-107 55 52 37 77 77 48 Non-42 9 Hardness as CaCO, Calcium, 182 88 89 22 63 56 139 144 96 106 Dissolved (residue 415 176 179 153 134 101 290 312 202 222 solids Ni-trate (NO<sub>3</sub>) 2.3 22.5 2.4 2.2 Chemical analyses, in parts per million, October 1962 to June 1963 Fluo-ride (F) 2.1.2 ٦. 44064 0.2 12 8.0 25 36 23 Chlor ide ĵ 23 23 13 24 Sulfate (SO<sub>4</sub>) 164 71 68 9 51 50 16 20 73 88 Bicar-bonate (HCO') 92 40 46 42 32 24 76 82 58 55 Po-tas-sium (K) Sodium (Na) Mag-ne-sium (Mg) Cal-cium (Ca) Fe) Silica (SiO<sub>2</sub>) Mean discharge (cfs) Nov. 1-30...... Dec. 1-22, 24-31.... Tan. 1-3, 7-25, 30-1-28..... Apr. 1, 5-30..... Apr. 1-30..... May 1-18, 20-29, 31. June 3-6, 10-30.... Oct. 1-31, 1962.... average.... Date of collection Time-weighted reb.

			597 7.4	672 7.2	187 7.1	399 7.8	
		181	77	138	40	47	30
		220	162	190	28	109	46
		475	366	414	106	244	16
		5.6	1.6	4.9	3.2	2.2	2.4
tance	-	9.0	٦.	4.	۰.	٥.	0.
fic conduc		83	38	54	10	23	7.0
of speci		195	143	181	43	93	36
Analyses based on monthly extremes of specific conductance		84	104	64	22	26	50
	Oct. 4, 1962 (maxi-	mum) (unu	Oct. 11 (minimum)	Nov. 1 (maximum)	Nov. 14 (minimum)	Dec. 8 (maximum)	Dec. 24 (minimum)

	_	_		-		_	_	_	_		_	
Jan. 11, 1963 (maxi- mum)		22	75 37	7.0	2,2	2.7	200	108	29	344	7.6	
Feb. 2 (maximum)		16	32	20 6.0	0,0	2.5	199	39	26	316	6.9	
Mar. 30 (maximum)		34	73	13	Ŧ.O.	2.9	138 81	33	52	254		
Apr. 30 (maximum)		94	128 91	39	1.0.	22	350 208	153	76	338		
May 16 (maximum) May 31 (minimum)		96	134 50	13	6.6	4.1.	395	172	94	640		
June 21 (maximum)		36	104	30	ຕຸຕຸ	1.8	273	124	38	441		

BIG SANDY RIVER BASIN--Continued

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

	l		l		
	Aver-	age	49 48 30	34	5 5 5 5 5
		31	37	34	1 4 1
		30	37	35	1 33
		29	34	113	52 54 57
		28	37		52 51 57
		27	57	32 34	52
		26		32	52
		25	61 46 45 38 39	32	53 53
		24			
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## TYGARTS CREEK BASIN

3-2170. TYGARTS CREEK NEAR GREENUP, KY.

LOCATION. --At gaging station at bridge on State Highway 7, 100 feet downstream from Lick Run, 0.4 mile upstream from Whiteoak Creek, and 6.5 miles west of Greeup, Greeup, Greeup County.

RECORDS AVAILABLE .-- Water temperatures: October 1956 to September 1963.

Sediment records: October 1965 of September 1963.
EXTREMES, 1966-63.—Water temperatures: Maximum, 81°F July 17, 19; minimum 33°F Jan, 26, 29, Feb. 26.
Sediment concentrations: Maximum daily, 1,000 ppm Mar. 5; minimum daily, 1 ppm Feb. 18, 19, 25, 14-29
Sediment Loads: Maximum daily, 1,0200 tons Mar. 5; minimum daily, 1 ses than 0.05 ton 0.05; 3, 14-29
SEGIMENT, 1966-63.—Water temperatures: Maximum, 83°F July 16, 23, 31, 1967, Sept. 11, 1966-1; minimum, treezing point on many days

during winter months.

Sediment concentrations: Maximum daily, 1,500 ppm May 27, 1960; minimum daily, 1 ppm on many days during 1956 to 1963.
Sediment loads: Maximum daily, 31,600 tons Feb. 28, 1962; minimum daily, less than 0,65 ton on many days during 1957 to 1962.
Sediment loads: Maximum daily, 31,600 tons Feb. 28, 1962; minimum daily, less than 0,65 ton on many days during 1957 to 1962.
Sediment loads: Maximum daily allow caused by withdrawal of water by gas transmission plant above gage. Flow affected by

Temperature (°F) of water, water year October 1962 to September 1963

7															Day																Aver-
Month	-	7	က	4	2	6 7		80	- 0	10	=	11 12 13	4	15	- 9	15 16 17 18 19	18	6	20	21	22	23	24	25	26	27 28	28	29	30	3.	age
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## QUALITY OF SURFACE WATERS, 1963

## TYGARTS CREEK BASIN -- Continued

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

E Estimated.

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 1962 to September 1962--Continued

Day dispersion of the property			YAM			JUNE		
Day   discharge   Carlot   Carlot	Suspended sediment		Suspended sediment			Suspended sediment		
2 488 22 3 364 14 4 308 6 5 275 5 6 275 5 6 275 5 6 275 5 6 275 5 6 275 5 6 275 5 6 275 5 6 275 5 6 275 6 7 215 2 9 182 2 11 149 2 12 133 2 11 149 2 12 133 2 14 115 2 14 115 2 14 115 2 14 115 2 14 15 2 14 15 3 20 85 3 21 97 2 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 79 3 22 70 2 22 60 2 23 74 2 25 70 2 26 64 2 27 60 2 27 60 2 28 26 6 31 Total 4949  Total 4949  Total 4949  Total 4949  1 87 E 6 23 10 7 20 10 8 18 10 9 16 8 17 20 10 19 16 8 10 14 8 11 14 8 11 14 8 11 14 8 11 14 8 11 15 5 16 25 6 5 28 7 6 23 10 7 20 10 8 18 10 9 16 8 17 16 8 19 17 16 8 10 17 17 11 14 8 11 14 8 11 14 8 11 15 5 12 15 1 13 4 22 13 4 11 14 8 11 15 5 12 13 4 11 14 8 11 15 5 12 13 4 13 13 11 14 13 6 15 12 5 16 12 5 16 12 5 17 20 10 3 20 11 5 5 14 5 5 5 14 5 5 5 14 5 5 5 14 5 5 5 14 6 5 5 5 5 5 5 5 5 5 5 5	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	
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	240	20 114	24	1 • 3 E 25	10	14 12		
31 230 154	96	107	48	14				
Total 1475	412.0	1729		457.5	2030		2848 •	

TYGARTS CREEK BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: B) bottom withdrawat thes; C, chemically dispersed; D, decantation; M, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Mathod	jo .	analysis	SBWC	SBWC	SBWC	SBN
		2.000				
		1.000				
	eters	0.500				
	millim	0,250	-	100	100	001
iment	ated, in	0.125	100	86	66	86
Suspended sediment	Percent finer than size indicated, in millimeters	.004 0.008 0.016 0.031 0.062 0.125	97	97	96	96
Suspen	han siz	0.031	93	06	92	96
	finer t	0.016	83	8	81	75
	Percen	0.008	72	70	67	58
		0.004	28	29	54	42
		0.002	45	46	41	28
Sodimont	discharge	(tons per day)				
Sediment	concen- tration	(mdd)	108	632	1560	1560
	Discharge (cfs)		2450	4260	3220	3220
Water	ling per-	(°F)				
0	ling	point				
	(24 hour)		1635	1630	1815	1815
	Date of collection		Nov. 10, 1962	Mar. 5, 1963	Mar. 19	Mar. 19

### SCIOTO RIVER BASIN

# 3-2268, OLENTANGY RIVER NEAR WORTHINGTON, OHIO

LOCATION.--Temperature recorder at gaging station, 30 feet downstream from Wilson Road Bridge, 1.5 miles northwest of Worthington, Pranklin country, and 2.5 miles upstream from Rush Run.

PRINKINGE REAL.--483 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1955 to September 1963.

RECORDS AVAILABLE.--Water temperatures: Maximum, 87°F July 1, 18; minimum, 33°F Dec. 10.

EXTREMES, 1965-63.--Water temperatures: Maximum, 88°F July 7, 1962; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1962 to September 1963

	e e												
Aver-	age	56	4 4 6	37	36	35	38	53	67	77	90	76	63
Г	31	9 4 9	11	25	38	1 1	52	11	70	11	81	73	1.1
	30	L 3	41	37	38	11	52	53	69	85	980	75	52
	29	49	41 38	37	38	1-1	52	59	65	984	82 78	73	63 57
	28	47	38	37	36	34	4 t B	57	71	90	984	73	63 58
	27	43	38	37	37	35	43	62 56	68 66	84 75	85 79	73	65
	26	441	39	36	37	35	43	53	69	83	85	73	56 56
	25	6 4 4	41	36	38	34	43	50	6.8	81	84	73	5.5
	24	52	, t o	36	36	34	39	50	5.65	78	82	75	63
	23	57	4 4 0	35	36	35	3.9	55	63	76	80	76	57
	22	57	4 2 4 2	36	38	35	38	61	65	74	80	92	65
1	21	57	4 4 5	36	36	35	39	61	67	74	13	74	69
	20	5.5	44	37	3.9	34	41	63	70	75	81	70	70
Day	19	5.5	444	37	38	34	38	63	71	75	4 8 0	72	71
:  !	18	61	t 4 4 4	37	37	34	3.9	58	69	77	87	74	70
i	17	67	4 8	36	3.5	3 %	41	5.0	70	76	83	73	70
Day	16	69	47	36	36	35	37	55	70	75	79	72	7.1
	15	6.5	47	35	36	35	38	500	63	74	77	72	70
	4	99	4 4 6	35	36	34	37	56	69	73	74	75	67
	13	68	4 4 5	35	8 K	34	37	5.6	57	70	77	79	69
	12	69	9 4 4	35	38	35	37	4 9 5	61	69	980	78	73
	=	67	47	35	3.5	35	35	54	70	0 5	7.8 6.6	77	73
	10	64	4 6	34	38	35	37	4 8 4	74	83	73	79	75
	6	63	4 9	36	38	35	39	53	75	83	76	78	75
	80	99	4 4 6	36	38	35	97	56	70	80	79	81	72
	-	65	44	35	60 60 80 80	35	3.7	57	68	78	79	980	71
	9	63	6 4	37	38	36	35	55	61	7.9	78	78	70
1	2	63	4 4	04	37	35	34	54	63	73	78	80	71
	4	59	4 6	38	35	35	34	60	59	71	77	82	7.2
	62	59	47	38	37	36	34	61	55	73	78	82 76	73
	2	500	4 5	38	35	38	34	61	92	73	7.8	980	69
	-	61	4 4 6	41	35	38	34	5.5	4 9	72	87 76	84	71
		11	11	; ;	: :	11	; ;	1 1	11	::	11	11	: :
	Month	October Maximum Minimum	Minimum	Maximum Minimum	January Maximum Minimum	Maximum Minimum March	Maximum Minimum	April Maximum Minimum	Maximum Minimum	Maximum Minimum	July Maximum Minimum	Maximum Minimum	September Maximum Minimum

### SCIOTO RIVER BASIN -- Continued

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

LOCATION .-- At Livingston Avenue Bridge, 0.2 mile upstream from gage at Columbus, Franklin County,

LOCATION. --At Livingston Avenue Bridge, 0.2 mile upstream from gage at Columbus, Franklin County, and 6 miles upstream from mouth, DRAINAGE AREA. --190 square miles. RECORDS AVAILABLE. --Sediment records: October 1960 to September 1963. EXTREMES, 1962-63. --Sediment records: Maximum daily, 650 ppm Mar. 4; minimum daily, 2 ppm on several days during January and February. Sediment loads: Maximum daily, 11,800 tons Mar. 5; minimum daily, 0.1 ton on many days. EXTREMES, 1960-63. --Sediment concentrations: Maximum daily, 700 ppm June 8, 1961; minimum daily, 2 ppm on several days during 1960 to 1963. Sediment loads: Maximum daily, 11,800 tons Mar. 5, 1963; minimum daily, less than 0.05 ton on Oct. 28, Dec. 14, 1960.

REMARKS.--Flow affected by ice Dec. 23, 24, Dec. 30 to Jan. 1, 14-17, Jan. 21 to Feb. 28.

Suspended sediment, water year October 1962 to September 1963

		OCTOBER			NOVEMBER	:		DECEMBER	
		Suspende	d sediment		Suspen	ded sediment		Suspende	d sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	9.0	37	0.9	12	9	0.3	23	6	0.4
2	12	43	1.4	11	8	•2	23	7	. 4
3	75	95 A	19	10	7	• 2	21	8	• 4
4	48	73	9.5	14	9	• 3	21	8	.4
5	30	61	4.9	30	13	1.0	23	9	• 6
6	27	46	3.4	17	13	•6	30	9	• 7
7	17	31 '	1.4	13	13	.4	36	10	1.0
8	21	16	.9	14	13	• 5	29	10	• 8
9	46	17	2 • 1	49	19	2.5	26	10	•7
10	43	15	1.7	420	278	315	26	10	• 7
11	24	15	1.0	500	201	271	27	10	•7
12	16	15	•6	200	83	45	27	9	• 6
13	12	14	•4	105	54	15	23	9	• 6
14	9.0	14	•3	71	44	8 • 4	21	10 '	•6
15	7 • 8	14	•3	51	40	5.5	21	10	• 6
16	11	14	.4	60	45	7.3	21	10	• 6
17	18	14	•7	200		E 40	24	10	• 6
18	9 • 6	16	.4	200		E 65	28	11	• 8
19	7.8	16	• 3	152	50	20	33	12	1.1
20	7.8	16	• 3	100	29	7.8	51	13	1.8
21	12	16	•5	. 78	22	4.6	83	17	3.8
22	11	12	• 4	61	17	2.8	103	21	5 • 8
23	10	13	•4	51	14	1.9	90	17	4.1
24	9 • 6	18	•5	42	12	1.4	80	12	2 • 6
25	14	14	•5	37	9	•9	58	8	1.2
26	16	8	•3	31	8	.7	51	6	• 8
27	12	6	• 2	29	10	.8	42	6	• 7
28	10	6	• 2	26	7	• 5 1	39	6	•6
29	9 • 6	10	•2	25	8	•5 <sub> </sub>	92	7	1.7
30	10	9	• 2	19	7	-4	130	7	2 • 4
31	10	9	• 2				110	7	2 • 1
Total	575.2		53.5	2628		820.5	1412		39.9

E Estimated.

A Computed from partly estimated-concentration graph.

### SCIOTO RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963--Continued

3 96 15 3.9 71 21 4.0 23 13 8.8 15 116 41 13 59 17 2.7 25 13 1.0 5 149 36 14 51 17 2.3 25 15 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	L		JANUARY			FEBRUARY			MARCH		
Day   Charge   Carbon   Carb	1		Suspende	ed sediment		Suspend	led sediment		Suspen	ded	sediment
2 61 7 1.2 24 23 1.5 897 E 6 6.3 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Day	dis- charge	concen- tration	per	dis- charge	concen- tration	per	dis- charge	concen- tration	T	per
3	1		8					67		Ε	
5 37 4 4. 60 29 4 11600 420 5 11800  5 37 4 4. 60 29 4 11600 420 5 11800  5 37 4 4. 70 25 7 4550 215 2550  6 37 4 4. 4. 110 19 5.6 4.7 11600 420 5 11800  7 37 4 4. 110 19 5.6 4.98 7 6 1020  9 38 4 4. 150 17 3 9 4.8 56 6.8  10 56 7 7 1 1 1 70 14 2.5 620 E 100  11 524 344 5 646 50 12 16 421 72 82  12 662 228 479 40 9 1.0 430 38 5 48  13 112 100 111 34 6 6 6 7 75 163 328  13 112 100 36 18 24 2 1 127 36 8 8 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2			1.2							
5 37	3	47	6	.8	60	37	6.0 5.3	2500		E	
1.	5									s	
1.		27		. "	70	25	4.7	4450	225		2050
9 37								1500	144	1	583
10 56 7 1.1 70 14 2.6 620 E 1.0  11 524 344 546 650 12 1.6 421 72 82  12 662 268 479 40 9 1.0 430 38 5 48  13 121 100 111 34 6 6 6 75 15 5 328  13 121 100 36 18 24 2 11 277 36 27  15 190 36 18 24 2 11 277 36 27  15 190 23 5.6 20 4 2 11 277 36 27  15 190 23 4.3 24 6 4 76 145 5 327  15 56 17 2.6 34 6 6 4 769 145 5 327  15 56 17 2.6 34 6 6 6 1020 251 11 20  12 56 17 2.6 34 6 6 6 1020 251 11 20  22 38 4 1 1 1.7 46 5 6 6 210 500 5 3080  22 46 4 5 5 56 5 8 30 106 180  22 46 4 1.5 56 5 8 8 30 106 180  22 38 4 .4 48 5 5 6 6 230 39 28  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 .5 182 28 14  22 36 3 .3 38 5 5 .5 182 28 14  22 36 3 .3 38 5 5 .5 182 28 14  23 24 2 2 .1 26 5 .4 174 28 13  27 26 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 26 5 .4 406 57 72  28 24 2 2 .1 2 2 2 .1 2 2 .1 2 2 .1 2 2 2 .1 2 2 2 .1 2 2 2 2	8	37			110	19	5 • 6	498	76	1	102
11 524 344 5 646 50 12 1.6 421 72 82 12 662 2288 479 40 9 1.0 430 38 5 48 15 1210 110 111 34 6 6 6 75 75 16 338 15 1210 36 18 24 2 1.1 277 36 27 16 160 28 12 22 3 .2 384 56 5 99 17 90 23 5.6 20 4 .2 11 277 36 27 18 662 22 3 .2 384 56 5 99 18 60 28 12 22 3 .2 384 56 5 99 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 4 6 .2 190 470 2510 18 60 27 20 20 21 1 1.7 40 6 5 .0 200 20 251 5 1140 22 60 6 .8 6 .6 6 .6 5 6 .0 200 20 251 5 1140 22 60 6 .8 6 .6 6 .0 200 20 251 5 1140 22 60 6 .8 6 .6 6 .0 200 20 251 5 1140 22 60 6 .8 6 .6 6 .0 200 20 251 5 1140 22 10 20 20 20 20 20 20 20 20 20 20 20 20 20	9		4 7	. 4	85				56	_	68
12	10	26	1 1	1.1	70	14	2.0	620		E	
134. 412 1000 1111 34 6 6 .6 .745 163 328 13. 19. 1900 36 18 24 2 .1 277 36 27 15. 1900 36 18 24 2 .1 277 36 27 17. 1900 36 18 24 2 .1 277 36 27 17. 1900 36 18 12 22 3 3.2 384 56 5 99 17 90 23 4.3 24 6 .4 .2 1980 470 2510 37 18. 69 23 4.3 24 6 .4 .7 1980 470 2510 18. 69 23 4.3 24 6 .4 .7 1980 470 2510 38 11 1.7 46 5 .8 .20 4 .2 1980 470 2510 38 11 1.7 46 5 .3 .7 19 98 11 1.7 46 5 .5 .6 20 4 .2 1980 470 2510 5 3060 20 98 11 1.7 46 5 .4 6 .6 1020 251 5 1114 20 98 11 1.7 46 5 .5 .6 20 20 98 11 1.7 46 5 .5 .6 20 20 98 11 1.7 46 5 .5 .6 20 20 251 5 114 20 98 11 1.7 46 5 .5 .6 20 20 251 5 114 20 98 11 1.7 46 5 .5 .6 20 20 251 5 .5 14 20 98 11 1.7 46 5 .5 .6 20 20 251 5 .5 14 20 98 11 1.7 46 5 .5 .6 20 20 251 5 .5 14 20 98 11 1.7 46 5 .5 .6 20 20 251 5 .5 14 20 98 11 1.7 46 5 .5 .6 20 20 251 5 .5 14 20 98 11 1.7 46 5 .5 .6 20 20 39 24 20 38 4 4 .4 48 8 5 5 .6 20 5 .8 320 55 48 22 38 5 3 .3 38 5 5 .5 185 28 14 22 38 4 .4 4 48 8 5 5 .6 20 39 24 22 38 4 .4 4 48 8 5 5 .6 20 39 24 22 38 4 .3 3 32 5 .4 1177 20 8.5 28 14 27 26 2 2 .1 1 26 5 5 .4 466 57 77 20 26 2 .1 1 26 5 5 .4 466 57 77 20 26 2 .1 1 26 5 5 .4 466 57 77 20 26 2 .1 1 26 5 5 .4 466 57 77 20 26 2 .1 1 26 5 5 .4 466 57 77 20 26 2 .1 1 26 5 5 .3 372 43 49 8 20 18 2 2 .1 1		524									
14   230   51   32   28   4   3   511   47   55   15   100   36   18   24   2   11   277   36   27   16   16.0   28   12   22   3   2   38   46   56   59   18   69   23   5.6   20   4   2   1980   470   2510   18   69   23   4.3   24   6   4.4   769   145   5   377   19   56   17   2.6   34   6   6   6   1020   251   5   1140   20   58   11   1.7   46   5   6   2110   500   5   3080   21   50   6   8   60   5   8   630   106   180   22   46   4   5   56   5   8   320   55   88   22   46   4   5   56   5   8   320   55   88   22   34   3   3   38   5   5   5   185   28   14   24   36   3   3   3   38   5   5   5   185   28   14   25   30   3     2   28   5     4   157   20   8.5   27   26   2   11   26   5     4   466   5   7   72   28   24   2     1             27   20   2     1               27   20   2     1               27   18   2     1                  Total   3250     1322.5   1283     49   3380     30575.8    APRIL		662								s	
15   190   36	13	412		111	34	6	- 3		163	ì	328
17.									36		27
17.	14	140	20	,,	22	2	2	300	5.6		0.0
18	17			5.6						١	
190. 56 17 2.6 34 6 5 6 1020 251 5 1140 200. 58 11 1.7 46 5 6 210 500 5 3080  21. 50 6 8 8 60 5 8 8 630 106 180 22. 46 4 55 56 5 8 8 620 55 88 23. 38 4 4 4 48 5 5 6 6 210 75 75 88 23. 38 3 4 3 4 4 48 5 5 6 6 230 75 75 88 24. 36 3 3 33 32 5 14 157 20 8.5 25. 34 3 3 .3 32 5 .4 157 20 8.5 26. 30 3 .2 28 5 4 157 20 8.5 27. 26 2 .1 26 5 4 466 5 7 72 28. 24 2 1 24 5 3 372 4 46 6 7 7 72 28. 24 2 1 1 118 23 18 31. 18 2 .1 1 118 23 18 31. 18 2 .1 1 118 23 18 31. 18 2 .1 1 118 23 7.3  Total 3260 1322.5 1283 49.5 33803 30575.8  **MAY***  **MAY***  **JUNE***  **APRIL***  **MAY***  **JUNE***  **APRIL***  **APRIL***  **APRIL***  **APRIL***  **APRIL***  **APRIL***  **APRIL***  **APRIL***  **APRIL***  **APRIL**  **APR		69	23	4.3	24	, 6	• 4	769	145	s	327
21 50 6 .8 60 5 .8 630 106 180  22 46 4 .5 56 5 5 .8 320 55 48  23 38 4 .4 48 5 6 6 230 39 22  24 36 3 .3 38 5 .5 185 28 14  24 36 3 .3 .3 38 5 .5 185 28 14  25 30 3 .2 28 5 .4 117 20 8.5  26 30 3 .2 28 5 .4 117 20 8.5  27 26 2 .1 26 5 .4 466 57 72  28 24 2 .1 26 5 .4 466 57 72  28 20 2 .1 200 33 18  30 18 2 .1 185 26 11  30 18 2 .1 155 26 11  31 18 2 .1 155 26 11  31 18 2 .1 18 23 7.3  Total 3260 1322.5 1283 49.5 33803 30575.8  APRIL	19	56		2 • 6		6			251	S	1140
221. 46 4 1.5 56 5 1.8 320 55 48 231. 38 4 1.4 48 5 1.6 230 39 24 241. 36 3 1.3 38 5 1.5 185 28 14 251. 34 3 1.3 38 5 1.5 185 28 14 251. 34 3 1.3 38 5 1.5 185 28 14 261. 30 3 2.2 28 5 1.4 177 20 8.5 5 261. 30 3 2.2 28 5 1.4 177 20 8.5 5 261. 262 2 1.1 26 5 1.3 466 57 281. 20 2 1.1 2.1 2.1 2.1 2.1 2.2 20 31 301. 18 2 1.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2	20		11	1.7	46			2110	i	3	
234. 38 4 4 48 5 6 6 230 39 224 24. 36 3 3 33 38 5 5 5 5 185 28 14 25. 34 3 .3 32 5 .4 157 20 8.5 26. 30 3 .2 28 5 .4 157 20 8.5 26. 30 3 .2 28 5 .4 174 28 13 27. 26 2 .1 26 5 .4 466 57 72 28. 24 2 .1 24 5 .3 372 49 49 29. 18 2 .1 150 25 18 30. 18 2 .1 150 25 18 30. 18 2 .1 1159 26 11 31. 18 2 .1 1159 26 11 31. 18 2 .1 1159 26 11 31. 18 2 .1 1159 26 11 31. 18 2 .1 1159 26 11 31. 108 19 5.5 112 40 12 38 46 4.7 31. 96 15 3.9 71 21 4.0 23 13 .8 4.1 116 41 13 59 17 2.7 25 13 .9 5. 149 36 14 4.1 50 18 2.4 22 17 7. 89 13 3.1 44 22 2.6 40 51 5 6.2 8. 75 13 2.6 39 21 2.2 31 34 2.8 8. 75 13 2.6 39 21 2.2 31 34 2.8 9. 70 9 1.1 4.3 38 17 1.7 2.6 12 10. 66 8 1.4 38 17 1.7 2.6 12 11. 59 10 1.6 35 15 1.4 1.3 25 14 1.1 11. 59 10 1.6 35 15 1.4 1.3 25 14 1.1 11. 59 10 1.6 35 15 1.4 1.3 25 14 1.1 11. 59 10 1.6 35 15 1.4 1.3 25 14 1.1 11. 59 10 1.6 35 15 1.4 1.3 25 14 1.1 11. 59 10 1.6 35 15 1.4 1.3 25 14 1.1 11. 59 10 1.6 35 15 1.4 1.3 25 14 1.1 11. 59 10 1.6 35 15 1.1 1.1 11. 59 10 1.6 35 15 1.4 1.3 25 14 1.9 11. 50 10 1.4 36 17 1.7 2.2 22 26 16 1.0 16. 42 10 1.1 39 12 11 1.1 15 13 .5 19. 10 1.2 48 17 1.2 2.2 22 16 1.0 16. 42 10 1.1 39 22 12 1.3 31 4.8 14 1.2 1.2 1.3 17 13 6.6 17. 55 33 5 5.4 38 14 1.4 1.5 13 .5 19. 102 74 5 32 30 11 1 1.9 14 1.2 21. 255 135 93 32 21 1.1 1.5 13 .5 22. 139 48 18 18 18 .4 22. 130 1.1 1.1 15 13 .5 22. 139 48 18 18 14 1.4 16 13 .5 22. 139 48 18 30 19 11 1.5 14 17 1.5 22. 130 14 1.1 15 13 .5 23. 24 22 17 1.0 1.0 24. 255 135 93 5.4 38 14 1.4 1.4 16 13 .5 25. 30 A 800 40 28 5 3.2 13 13 .4 21. 255 135 93 5.4 38 14 1.4 1.5 13 15 .5 22. 139 48 18 18 18 .4 22. 130 1.1 1.1 15 13 .5 25. 14 2.2 2.1 16 1.0 22. 139 48 18 18 18 .4 22. 130 1.1 1.1 18 14 1.7 7 7 18 .6 22. 139 48 18 18 18 .4 24. 25. 25. 25. 25. 25. 25. 25. 25. 25. 25	21			.8			•8			ļ	
24 36 3 .3 38 5 .5 .6 185 28 14 25 34 3 .3 32 5 .4 157 20 8.5 26 30 3 .2 28 5 .4 157 20 8.5 27 26 2 .1 26 5 .4 174 28 13 27 26 2 .1 24 2 .1 24 5 .3 372 49 49 29 20 2 .1 200 33 18 30 18 2 .1 155 26 11 31 18 2 .1 155 26 11 31 18 2 .1 155 26 11 31 18 2 .1 155 26 11 31 18 2 .1 155 26 11 31 18 2 .1 118 23 7.3  Total 3260 1322.5 1283 49.5 33803 30575.8  APRIL	22			• 5		5		320	55		
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27 26	25				32	5		157	20	1	8.5
27 26	26	3.0	3	.2	28	5 !	- 4	174	2.8		13
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4         116         41         13         59         17         2.7         25         13         .9           5         149         36         14         51         17         2.7         25         13         .9           6         108         14         4.1         50         18         2.4         22         17         1.0           7         89         13         3.1         44         22         2.6         40         51         5         6.5           9         70         9         1.7         38         20         2.0         30         14         1.1           10         66         8         1.4         38         17         1.7         26         12         .8           11         59         10         1.6         35         15         1.4         31         14         1.2           12         53         10         1.4         35         14         1.4         1.2           13         50         10         1.4         35         14         1.4         1.2           13         40         10         1.2 </td <td>2</td> <td>102</td> <td>17</td> <td>4.7</td> <td>89</td> <td></td> <td>7.7</td> <td>30</td> <td>26</td> <td></td> <td>2.1</td>	2	102	17	4.7	89		7.7	30	26		2.1
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6 108 14 4.1 50 18 2.4 22 17 1.0 7 89 13 3.1 44 22 2.6 40 51 5 6.5 8 75 13 2.6 39 21 2.2 31 34 2.8 9 70 9 1.7 38 20 2.0 30 14 1.1 10 66 8 1.4 38 17 1.7 26 12 8  11 59 10 1.6 35 15 1.4 1.7 26 12 8  11 59 10 1.4 35 14 1.3 25 14 1.9 12 53 10 1.4 35 14 1.3 25 14 1.9 13 50 10 1.2 39 24 2.5 31 22 1.8 15 43 10 1.2 39 24 2.5 31 22 1.8 15 43 10 1.2 39 24 2.5 31 22 1.8 17 55 33 5 5.4 38 14 1.4 1.4 16 13 6.6 17 55 33 5 5.4 38 14 1.4 1.4 16 13 6.6 18 47 20 2.5 34 12 1.1 15 13 .5 19 102 74 5 32 30 11 2.9 14 13 .5 19 594 500 A 800 40 28 5 3.2 13 13 .4 21 255 135 93 32 21 1.8 17 16 .7 22 139 48 18 30 19 1.5 14 17 6.6 22 267 410 A 300 25 17 1.1 12 18 6.2 24 125 43 11 22 15 99 10 1.5 14 17 6.6 24 125 43 14 2.2 26 14 1.8 17 16 .7 25 96 22 5.7 20 14 .8 8 18 .3 27 66 17 3.0 17 18 14 .7 28 99 14 2.2 26 14 1.0 6.3 15 .2 28 59 14 2.2 26 14 1.0 6.3 15 .2 28 59 14 2.2 26 14 1.0 6.3 14 .2 29 76 17 3.5 158 79 58 18 5.9 14 .2 21 60 17 3.0 17 13 66 6.3 15 .2 28 59 14 2.2 26 14 1.0 6.3 14 .2 29 76 17 3.5 158 79 58 18 5.9 14 .2 29 76 17 3.5 158 79 58 18 5.9 14 .2 29 76 17 3.5 158 79 58 18 29 59		149		14			2.7				
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12 53 10 1.4 55 14 1.3 25 14 49 1.3 17 1.4 1.5 1.4 1.5 1.4 1.5 1.5 1.4 1.5 1.5 1.4 1.5 1.5 1.4 1.5 1.5 1.4 1.5 1.5 1.4 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	10	66	8	1.4	38	17	1.7	26	12		•8
13     50     10     1.4     56     34     5     6.7     38     19     1.9       14     46     10     1.2     39     24     2.5     31     22     1.6       15     43     10     1.1     39     12     1.3     17     13     .6       16     42     10     1.1     39     12     1.3     17     13     .6       18     47     20     2.5     34     12     1.1     1.5     13     .6       18     47     20     2.5     34     12     1.1     1.5     13     .5       19     102     74     5     32     30     11     .9     1.4     13     .5       20     594     500     A     800     40     28     5     3.2     13     13     .4       21     255     135     93     32     21     1.8     17     16     .7       22     139     48     18     30     19     1.5     14     17     .6       23     267     410     A     300     25     17     1.1     12     18											1.2
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15   43				1.4	56 39	34		38	22		1.9
17     55     33     5     54     38     14     1.4     16     13     .6       18     47     20     2.5     34     12     1.1     15     13     .5       19     102     74     5     32     30     11     .9     14     13     .5       20     594     500     A     800     40     28     S     3.2     13     13     .4       21     255     135     93     32     21     1.8     17     16     .7       22     139     48     18     30     19     1.5     14     17     .6       23     267     410     A     300     25     17     1.1     12     18     .6       24     125     43     14     22     15     .9     10     19     .5       25     96     22     5.7     20     14     .8     8     18     .4       26     80     19     4.1     18     14     .7     7     7     18     .3       27     66     17     3.0     17     13     .6     6.3     15	15			1.2						1	
17     55     33     5     54     38     14     1.4     16     13     .6       18     47     20     2.5     34     12     1.1     15     13     .5       19     102     74     5     32     30     11     .9     14     13     .5       20     594     500     A     800     40     28     S     3.2     13     13     .4       21     255     135     93     32     21     1.8     17     16     .7       22     139     48     18     30     19     1.5     14     17     .6       23     267     410     A     300     25     17     1.1     12     18     .6       24     125     43     14     22     15     .9     10     19     .5       25     96     22     5.7     20     14     .8     8     18     .4       26     80     19     4.1     18     14     .7     7     7     18     .3       27     66     17     3.0     17     13     .6     6.3     15	16	42	10	1.1	20	12	1.3	17	12		- 6
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Total 3339 1356.3 1466 135.1 627.5 37.8	30				82	83	18			Ε	3
						+				<u> </u>	
				1356.3	1466		135•1	627.5	<u></u>		37.8

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

### QUALITY OF SURFACE WATERS, 1963

### SCIOTO RIVER BASIN -- Continued

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

Suspended sediment, water year October 1962 to September 1963--Continued

		JULY			AUGUST		-	S	EPTEMBE	R
Ī		Suspen	ded sediment		Susper	rded	sediment		Susper	ded sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)		Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	18		A 1	30	13		1.0	2•3	27	0+2
2	26		E 2	20	12	1	•6	2 • 1	22	•1
3	12	14			11		• 4	2.5	22	•1
4	12	13			11		• 4	2 • 1	15	• 1
5	16	13	•	9.9	13		•3	2.0	14	•1
6	12	13		4 8.7			• 3	2.0	27	-1
7	9.3	16			17	S	1.2	2 • 0	18	•1
8	6.8	24			13		• 5	2.3	16	• 1
9	7.4	22			35	A	2 2	2 • 3	16	•1
10	5.9	20		3 18	40	A	2	2 • 5	17	•1
11	4.5	15					•2	2.9	13	•1
12	4.3	14			14		• 2	25		E 7
13	4 • 3	12			20	S	1.4	5 • 0	26	.4
14	20		S 1.				• 3	3 • 1	17	•1
15	8.7	10	•	2 6.8	14		• 2	2.5	16	•1
16	7 • 4	9					•2	3.8	17	• 2
17	5.4	9			13	i i	•2	4.3	19	•2
18	3 • 8	9				1.	• 2	3.5	20	• 2
19	5.0	9	•	20	57	S	6.1	2.9	23	•2
20	42		E 4	64	55	S	13	2 • 1	22	•1
21	44		E 5	14	17		•6	2 • 1	21	•1
22	62		A 6	4.3		1	• 2	2.0	21	•1
23	34	18	1.				•1	2.0	17	•1
24	21	18	1.			1	•1	2•7	15	• 1
25	15	18	•	7 2.9	16		•1	3.1	15	• 1
26	9.9	17	•				•1	2.9	15	•1
27	8.0	17					• 2	2 • 7	15	•1
28	6.8	18				1_	-1	2 • 7	15	•1
29	9 • 2	26				E	9 .	2.7	15	• 1
30	11	19					•6	2.5	15	• 1
31	26	15	1.	2.5	36	1	•2			-
Total	477.7		30.	4 402.4			42.0	102.6		10.7

SCIOTO RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: B) bottom withdrawal thee; C, ofhermically dispersed by, decambiding N, in matter water; P, pipe; S, sieve; V visual accumulation tube; W, in distilled water)

1	of o	analysis	SBWC SBWC SBWC SBN SBN
		2,000	
		1.000	
	eters	0.500	
	millim	0.250	100
lment	Percent finer than size indicated, in millimeters	0.031 0.062 0.125 0.250	100 100 97 96 100
Suspended sediment	e indica	0.062	99 93 89 99
Suspen	han siz	0.031	97 97 86 86 97
	finer	0.016	91 85 75 70 95
	Percent	002 0.004 0.008	80 74 63 52 88
		0.004	70 62 49 32 76
		0.002	57 51 39 21 62
	discharge	(tons per day)	
Sediment	concen- tration	(mdd)	439 633 1220 1220 441
	Discharge (cfs)	Ì	775 5570 5570 5570 292
Water	per-	(°F)	
	ling per-	point	
	Time (24 hour)		1710 1500 1845 1845 0840
	Date of collection		Nov. 10, 1962. Jan. 11, 1963. Mar. 4. Mar. 4.

### SCIOTO RIVER BASIN -- Continued

3-2315. SCIOTO RIVER AT CHILLICOTHE, OHIO

LOCATION: --Temperature recorder at gaging station at north end of Chillitothe, Ross County, and 450 feet downstream from Bridge Street Bridge on US. Highway 23.

DRAINAGE AREA.--3, 847 square miles.

RECORDA ARIALER.--Chemical analyses: October 1950 to September 1951.

Water temperatures: October 1950 to September 1951. October 1953 to September 1963.

PREPARES. 1950-63. — Mater temperatures: Maximum 83°F July 26, 27, Aug. 3, 4; minimum, freezing point on many days during USTREMES. 1950-51. 1950-52. — Mater temperatures: Maximum, 89°F July 14, 1964, Aug. 2, 3, 1955; minimum, freezing point on many days during days during whiter months.

Temperature (°F) of water, water year October 1962 to September 1963

17	_														Day	Ŋ.														_	Aver-
Month		2	6	4	5	9	r-	∞	6	2	=	12 1	13 14	<u> </u>	15 16	3 17	82	19	20	21	22	23	24	25	26	27	28	29	30	31	age
October		-									_	$\vdash$			-	-				├	-	:				:	:	:	:		
Maximum	_	62	62	49	79	49	99	99			-									8	_	9		۲,	7	*	2 :	7	7	<b>3</b>	70
Minimum November	. 29		62	62	63	63	49	65	69	<b>7</b>	9 49	9 99	67 66		67 68	99	9 9	62	61	9	<u>د</u>		5	2	6.4	40	40	20	o. •	8	9
Maximi	0 7	4	4.8	4.8	ď	8 7	8 7	4.7	8 7	8.9	7 0 1	0 7	84 48		47 48	7	84	7	4.7	4	44	44	77	6.4	4	6.4	.4	4 2	. 4	1	44
			0 0	9 4	2	2		- 17	_			_				- 4						4		6.7	7	4		4 4		1	94
			,	2	-	-		-	_													:	:	:	:		:	:	:		:
Maximum	4	4	4.1	4	4 ]	7	39	38										_						35	35	35	34		34	33	36
Minimum			0 4	4.1	41	3.9	38	37	36	35	34 3	33 3	33 33		32 33	32	32	32	33	35	36	36	35	34	34	34	33	34	33	32	35
January	_			_			_		_				_		_		_	_		_		_									
Maximum			32		32	33	34	34				37 3	35 34		33 33	-	34	35	35			33		33	33	33	33	33	32	32	34
Minimum	32	32	32	3.2	32	32	33	34	34	36	36 3	_		_	3 33	33				33	33	_	33	33	33	33	33	35	32	32	33
rebruary				5		2.5	2	7,0				_	- 2		2.2			4.5	35	3.6	76	3.2		7.7	3.6		0	1	ŀ	1	77
		-	7 6	3 6	20	20	1	, i	_										_	,		, ;		, ,		;	1 0	-			
March	۶	36	35	35	35	3.2	35	4	4	<b>*</b>	٠ *	٠ *	34		35 35			5	_	ń	_	76		2	25	20	20	1			0
Maximum	33		34	34	34	34	34	36				36 4	40 41		40 40	43			4	_	7 4	42		46	47	4	8 4	64	52	53	4.1
Mınımum		32	34	34	34	34	34	35	36	36	36 3		36 40		39 39	<b>4</b>	0 43	44	43	4	7	4,1	45	45	9 4	4.7	8 4	4 8	64	25	9
Anril	_								_		_			_					_												
Maximum	55	9.8	5.9	69	58	56	57	57	55	55	55	55 5	55 55		56 56	28	8 6 1	62	63	63	9	9	55	53	56	58	61	61	9	1	58
Mınimum			58	28	96	54	55	55				_				_			_	9	_			52	53	55	57	9	57	ï	96
May			-	_											_	_								-				,		í	
Maximum	. 57	28	9	79	49	99	99	67					61 65		94 99	_	9		9	ò	8	6	4	÷ :	9	9	9	8	٠	7	0
MINIMUM	_		26		62	63	63	63	65	89	9 79	61 6			_	69		9						79	63	ô	4	9	99	9	ç
Meximum	,		7,,	7,	7.2	7.5	7.2	7.6	_		_	77			75 74		_	_	_	7.5	_		_	102	0	70	4,5	0	2	1	74
Minimum		: -	7.7	10	. 6		: =	2 2	14	100	777	_	72 73	_		7	73	73	2	70	20	7	72	14	75	7.7	. [-	15	7.3	:	73
									-			_	_			_	_					_									
Maximum			8 1	_	19	7.8	7.5	77		_		_		-										81	83	83	82	82	82	85	19
	. 80	19	78	16	75	7.5	14	73	73	72	72 7	72 7	73 73		72 73	75	18	7.9	17	75	16	16	11	7.8	42	79	80	19	11	78	16
August								_	-			_		_						_				j			;	i	-	;	;
Maximum	85	85	80	693	85	80	79	29	6	6	79 7	_	78 76		74 75		9 / 9		7	2	2.2	9 :	2	2 :	<b>*</b> :	ζ;	2 ;	٠;	2 2	0 1	- :
Minimum		_	2	_	6	20	9	-	_	_		-	0	_	<u>-</u>	7/		1		ò 				7	6	-	7	*	7	7	•
Maximum		73	7.5	75	74	73	73	1	1	1	1	-	+	_	1	:	1	1	1	1	1	99	99	65		6.5	6.5	63	62	1	1
Minimum	7.1		7.2		71	70	69	1	ì	!	+	<u>'</u>	1	-		!	1	!	1	!	1	9		6	3	62	62	62	29	1	1

### SCIOTO RIVER BASIN -- Continued

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

DALINGE AREA. -5,129 square miles.

DALINGE AREA. -5,129 square miles.

DEFINATION: --At gaging station at highway bridge, 0.8 mile downstream from Walnut Creek, and 1.2 miles north of Higby, Ross County.

DALINGE AREA. -5,129 square miles.

Sediment recorders. October 1953 to September 1963.

Sediment concentrations: Maximum dally, 1940 ppm & Rar. 5; minimum dally, 15, ppm App. 16, Sept. 3.

Sediment loads: Maximum dally, 1940 ppm & Rar. 5; minimum dally, 15 tons Sept. 3.

EXTREMES, 1963-63.—Water temperatures: Maximum dally, 1960 tons Mar. 5; minimum dally, 15 tons Sept. 3.

Sediment loads: Maximum dally, 132, 000 tons Mar. 5; minimum dally, 1960; minimum dally, 1900 tons Mar. 5; minimum dally, 1000 sept. 1000 tons Mar. 5; minimum dally, 1000 sept. 1000 tons Mar. 1000 tons

Temperature (°F) of water, water year October 1962 to September 1963

Aver-	age	54 49 37	0 0 4 0 0 4	7 9 7	82 78
_					
	8	313	26 1 4	151	4 4 4 1 6 1
	30	51	4 1 4	2 1 8 4 1 4	52 73
	29	5.2 4.6 3.7	5.5 5.8	25 85 85	78
	27 28	4 4 4 0 0 0	3 6 52	2007	30 × 4
	27	447	22.4	900	77
	26	214	222	321	9 7 9
	25	1.4 J	42 55 55	55 65 81	35
	23 24 25 26	55 46 32	32	50	4 10 3
	23	4.6	32,4	51	83
	22	60 45 35	32 38 40 40	61 66 80	81
	21	63 44 37	32	78	78
	20	4.5 3.5	4 3 5 5 5 5 5	66 67 72 70 80 75	85 80
	15 16 17 18 19 20 21 22	65 65 46 45 42 35	45.5	96 72 80	85
	18	044 0.x.)	4 4 5 9 9	8 2 8	35
	17	68 51	35	400	85
Day	9_	51	35	56 70 76	382
_	15	73	32	54	81
	4	7.2 5.4 3.2	325	55	75
	13	73	325	0.01	3 4 8 0
	11 12 13	74 50 32	4 2 3	26.5	80
	Ξ	76 49 32	3 4 6	56 80	900
	0	4.48 3.2	2 K K 2 K B	54 68 81	7.9
	01 6	72 52 34	30 45	53 69 81	76 79 79 80
	80	71 53	0 4 0	9.2	73
	7	69 46 38	8 6 6	58 71 82	79
	9	38	43	60	81
	3	164	44 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	59 76	6 4 4
	4	6 4 4 8 4 8 8 8	37	1 9 1	81
	6	55 50 46	8 8 8 8 9 4 9	65 66 72	96
	2	66 50 46	33	68 60 71	9.6
	-	52	37	56 56 76	83
,	Month	October November December	January February	April	JulyAugust

### QUALITY OF SURFACE WATERS, 1963

### SCIOTO RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963

-		OCTOBER		ļ	NOVEMBER			DECEMBER	
	Mean	Suspend	led sediment	Mean	Suspen	ded sediment	Mean	Suspend	led sedimen
Day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	586	15	24	586	23	36	1080	30	87
2	554	13	19	578	19	30	1040	23	64
3	578	10	16	574	18	28	1010	15	41
4	705	14	27	570	13	20	1000	17	46
5	888	19	46	591	13	21	994	24	64
6	725	16	31	604	7	11	1030	23	64
7	658	10	18	632	11	19	1110	21	63
8	618	9	15	609	14	23	1120	18	54
9	604	12	20	621	22	37	1040	16	45
10	609	14	23	2700	432	S 3680	994	16	43
11	632	14	24	4190	556	6290	940	22	56
12	668	10	18	3690	204	2030	853	21	48
13	637	8	14	3200	133	1150	811	19	42
14	604	8	13	2520	68	463	. 846 839	3 8 3 0	87 68
15	574	8	12	1970	46	245	839	30	
16	562	10	15	1750	33	156	853	37	85
17	586	15	24	2010	59	320	860	30	70
18	591	17	27	2840	102	782	884	22	52
19	591	18	29	3630	135	1320	924	20	50
20	566	17	26	3580	101	976	1100	26	77
21	558	17	26	3230	70	610	1460	37	146
22	542	18	26	2880	63	490	1970	66	351
23	542	18	26	2480	52	348	1940	42	220
24	539 546	12 12	17 18	2060 1720	23 26	128 121	1710 1560	26 15	120 63
23			-	£					
26	550	13	19	1560	23	97	1580	9	38
27	558 574	17	26 28	1470 1380	2,3 26	91 97	1460 1300	9 16	35 56
28					26	88			S 292
30	582 574	17 18	27 28	1260 1150	28	87	1730 2280	52 73	449
31	595	25	40	1120			2100	33	187
Total	18696		722	56635		19794	38418		3163
		JANUARY			FEBRUAR	· · · · · · · · · · · · · · · · · · ·		MARCH	
-		1						T	
1	1860 1680	34 27	171 122	1060 1150	31 24	89 74	2600 9940	117 508	S 1860 13600
3	1570	28	119	2660	85	s 663	8340	342	7700
4	1520	31	127	2820	82	624	18000	494	31200
5	1300	33	116	2360	35	223	67200	1940	352000
6	1200	23	74	2290	35	216	101000	901	246000
7	1180	20	64	3080	56	466	93600	540	136000
8	1150	24	74	3470	50	468	62400	358	60300
9	1130	28	85	3070	34	282	39400	235	25000
10	1130	28	85	2960	28	224	28800	232	18000
11	2590	159	S 1350	3160	34	290	23400	182	11500
12	9700	599	15700	3070	43	356	21500	152	8820
13	9780		S 6630	2290	34	210	19400	135	7070
14	6530	129	2270	1900	27	138	18200	116	5700
15	4530	66	807	1460	25	98	17600	101	4800
16	3740	44	444	1270	24	82	17300	362	5 18300
17	3080	46	382	1260	22	75	33700	1480	135000
18	2770	36	269	1210	23	* 75	31800	628	53900
19	2410	34	221	1260	27	92	36300	571	56000
20	2240	35	212	1520	42	172	44700	687	82900
21	1850	25	125	1820	33	162	37200	442	44400
22	1470	24	95	1640	19	84	31600	215	18300
23	1200 1040	27 25	87 70	1580 1750	32	136 118	20200 13500	194 187	6820
24	1340	31	112	1720	20	93	12900	157	5470
- 1					, ,	73		97	
26	1300	33	116 98	1510 1380	18 16	73 60	12400 11800	110	3250 3500
27	1210 1100	22	98 65	1200	17	55	11900	97	3120
29	1100	23	68	1200	17		11800	102	3250
30	1130	23	70				8710	98	2300
		1 75 1					7490	81	1640
31	1080	21	61				1470	0.1	1040

S Computed by subdividing day.

### OHIO RIVER BASIN

### SCIOTO RIVER BASIN -- Continued

3-2345. SCIOTO RIVER AT HIGBY, OHIO--Continued
Suspended sediment, water year October 1962 to September 1963--Continued

S Computed by subdividing day.

146

Method of analysis

2.000

SBWC SBN SBWC

SCIOTO RIVER BASIN--Continued

3-2345. SCIOTO RIVER AT HIGBY, OHIO--Continued
Particle-size analyses of suspended sediment, water year October 1962 to Soptember 1963
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;

				P, pipet;	S, sieve; V, v.	P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)	tube; W	, in dis	tilled w	ater)	٠						
		9	Water		Sediment	Sodimont				S	Suspended sediment	d sedin	nent				
Date of collection	Time ling per-	ling	per-	Discharge (cfs)	concen- tration	discharge		P,	ercent f	Percent finer than size indicated, in millimeters	n size	indicat	ad, in	millim	eters		
		point	(FF)		(mdd)	(tons per day)	0.002	002 0.004 0.008 0.016 0.031 0.062 0.125 0.250 0.500	0 800.	. 016 0.	031 0	062 0	125 (	. 250	0.200	1.000	
Mar. 5, 1963 Mar. 5	1000 1000 1400			60500 60500 60600	2600 2600 2820		51 37 50	63 52 64	78 71 76	88 98 88	96 95 97	97 96 99	98 98 100	100			
	Street, or William or Street, or other passesses.							-								1	

### SCIOTO RIVER BASIN -- Continued

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

OCATION .-- At bridge on State Highway 348 at Lucasville, Scioto County, 0.4 mile downstream from Miller Run, and 4.9 miles upstream from Scioto Brush

DRAINAGE AREA.--6,176 square miles.
RECORDS AVAILABLE.-Chemical analyses: October 1956 to September 1963.
Water temperatures: October 1956 to September 1993.
EXTREMES, 1962-63,--Dissolved solids: Maximum, 475 ppm Sept. 1-30; mir

EXTREMES 166-63.—Dissolved solids: Maximum 177 ppm Mar. 1-5, 13-19, 26-31.

Bardness: waximum 8 solids: Maximum 177 ppm Mar. 1-5, 13-19, 26-31.

Specific conductance: Maximum 82 7 July 28; minimum freezing point on many days during December to March.

Specific conductance: Maximum 82 7 July 28; minimum freezing point on many days during December to March.

Rarchines: Maximum 82 7 July 28; minimum 479 ppm Mov. 11-07, 1966 minimum, 107 ppm Mov. 11-07, 1966 minimum, 107 ppm Mov. 11-07, 1966 minimum, 107 ppm Mov. 11-07, 1966 minimum, 107 ppm Mov. 11-07, 1967 minimum daily, 207 micromhos May 8, 1961.

Rarchines: Maximum daily, 806 micromhos Sept. 26, 1963; minimum daily, 207 micromhos May 8, 1961.

Water temperatures: Maximum, 857 July 22, 1967; minimum, freezing point on many days document months.

Water temperatures on secretic conductance and pin of daily samples available in district office at Columbus, Obito. No discharge records available.

Chemical analyses, in parts per million, water year October 1962 to September 1963

Color 7.7 1 ł 펌 550 565 645 713 739 718 569 597 549 555 370 623 conductat 25°C) (microance mhos 92 90 88 87 82 56 880 889 889 889 84 magne-carbon-Non-Hardness as CaCO, 290 244 252 252 246 239 266 266 292 312 312 314 Calcium, 170 272 sium solids (residue at 180°C) 344 343 360 344 359 240 354 378 387 447 458 Dissolved 390 5.8 Ni-trate (NO<sub>3</sub>) 4.7.2 4.7.4 4.0 4.0 7,2 10 ٠ ٠ ٠ ٠ ٠ ٥. 20000-0 4.0 Fluoride Ē Chloride 26 26 30 30 12 118 20 20 37 42 46 30 <u>C</u> Sulfate 8 888888 71 78 78 93 99 106 51 8 bonate (HCO3) 241 200 200 194 192 226 232 232 256 256 276 278 278 Bicar-Po-tas-sium (K) Sodium (Na) Mag-ne-sium (Mg) Cal-cium (Ca) fron (Fe) Silica (SiO<sub>2</sub>) discharge Mean (cfs) 1-12, 17-31.... 1-23, 1963.... 10-28.... 1-5, 13-19, Apr. 1-30..... May 1-31..... June 1-30..... July 1-31..... Aug. 1-31..... 1-31, 1962.... 25-31..... Date of collection Time-weighted Dec. Jan. Feb.

a Represents 91 percent of days.

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

Mag- Sodium tas- Solitate	Analy	Analy	Analy	Analy		ses pas	ed on mo	athly	extremes	s of spec	Analyses based on monthly extremes of specific conductance	ctance							
Clum         Simmler         Statistics         Consisting         Consisting         Consisting         Carlchung         Non-           (Ca)         (Mg)         (Kg)		2		Cal-	Mag-	1	Po-		Gulfoto	Chloride	Fluo-	Ni-	Dissolved	Hard as Ca		Specific conduct-			
1122         42         0.7         6.9         496         310           40         9.0         .2         4.6         378         250           116         49         .2         7.0         454         290           40         .2         5.3         454         290           60         .2         .3         156         104           80         .34         .4         1.7         250         146           80         .34         .4         1.7         250         146           80         .32         .4         1.7         250         146           80         .32         .4         1.7         250         146           87         .20         .4         1.7         250         146           87         .2         .4         1.0         264         146           88         .29         .6         5.5         377         266           88         .29         .4         6.5         304         323           89         .4         6.5         304         323           102         .4         6.5         304         3	discharge (SiO <sub>2</sub> ) (Fe)		(Fe)		Clum (Ca)	sium (Mg)	(Na)	Stum Stum (K)		(30°)	(C1)	ride (F)	trate (NO <sub>3</sub> )		Calcium, magne - c sium		(micro- mhos at 25°C)	띥	Color
116         49         9         7.0         454         29           40         9         7.0         7.0         156         104           114         18         6         5.1         166         104           60         18         6         7.5         166         146           80         18         7         17.5         220         146           96         32         7         10         244         17         200         184           87         7.0         1         4.0         312         206         184         116         206           80         24         4         8.0         40         16         302         146         166         173         166         173         176         176         176         176         186         179         176         186         188         173         176         186         188         173         176         176         176         176         176         176         176         177         176         176         177         176         178         178         176         176         176         176         178									263 210	122 94	42 32	0.7	9.4	496 378	310	94	772	11	
114									234	116	49 9.0		5.3	454 156	290	98	773	7.3	
89         34         .4         7.5         376         266           60         18         .4         17.5         250         184           96         32         .5         9.2         400         264           27         .2         .4         10         312         206           87         .2         .6         .6         .9         164         116           80         .24         .4         8.0         410         302         116           48         .12         .3         .1         28         173         128           65         .4         .5         .4         440         323           65         .4         .5         .4         440         323           112         .3         .4         .4         440         323           12         .4         .4         .6         .3         44         236           12         .4         .4         .4         440         323           12         .4         .4         .4         440         328           12         .4         .4         496         328									272	114	18	e. o.	5.1	460 196	294 146	70	771 357	7.6	
96 32 19.2 400 264 87 29 6 4 10 377 266 88 24 18 18 28 116 89 24 18 19 164 116 80 25 18 25 27 288 80 27 29 6 10 10 10 10 10 10 10 10 10 10 10 10 10									228	88 09	34	4.4	7.5	376	276	88	624	7.6	
85         29         .6         5.5         377         266           80         24         .4         8.0         164         116           48         12         .4         8.0         164         116           82         12         .4         8.0         412         236           85         18         .4         6.5         304         212           96         40         .5         4.2         312         236           112         35         .4         8.2         312         236           122         27         .2         3.0         338         238           108         45         .8         5.3         414         286           114         51         .5         414         288           114         51         .5         5.5         414         288           114         51         .5         3.5         414         288           114         51         .5         3.5         414         288						-			206	96	32	c. 4	9.2	400 312	264	94	614 469	7.1	
86 24 18.0 410 302 82 12 1 1 1 1 2 18 96 40 5 4 6 5 0 304 212 97 40 5 4 6 5 0 304 212 98 40 5 4 8 2 312 112 27 2 1 3 0 338 108 45 8 5 3 44 114 51 5 3 5 5 88 114 51 5 3 5 3 5 88									a204 106	85 27	29	9.8	5.5	377	266	29	601 259	8.5	
82         25         .4         5.0         412         296           96         40         .5         4.2         304         222           96         40         .5         4.2         312         236           72         .4         8.2         312         236           112         35         .4         .4         496         328           108         45         .8         3.3         238         238           114         51         .5         5.5         414         288           114         51         .5         3.5         510         328           12         .7         3.5         510         328           13         .5         3.5         414         288           14         51         .5         5.5         422         288									b246 142	80 48	24 12	4.0.	8.0	410 238	302	. 56	624 367	8.6	
96 40 .5 4.2 440 323 112 35 .4 4.2 312 236 126 108 45 .5 5.5 414 288 114 51 .5 3.5 510 288 115 510 510 510 288									260	82	25 18	4.4.	5.0	304	295	70	616 454	8.2	
112         35         .4         .4         .4         496         328           72         27         .2         3.0         338         228           108         45         .8         5.3         419         321           89         29         .5         5.5         414         288           114         51         .5         3.5         510         322           86         26         .4         3.5         422         288									296	96	32	č.4.	8.2	312	323	08	724	8.2	
108 45 .8 5.3 495 324 89 29 .5 5.5 414 228 114 51 .5 3.5 510 288									300	112	35 27	4.0	3.0	496 338	328 238	82	753	7.6	
114 51 .5 3.5 510 322 86 26 .4 3.5 422 288									286	108 89	45 29	æ.v.	5.5	414	324	989	771	7.8	
									288	114 86	51 26	r. 4.	3.5	510	322	88	806 655	7.4	

Sept. 2 (minimum)...
a Includes 10 ppm carbonate (CO<sub>3</sub>).
b Includes 18 ppm carbonate (CO<sub>3</sub>).

 75 75

Average

32 18

SCIOTO RIVER BASIN--Continued

January..... February..... March..... April...... May.......

August ......

October ..... November .....

Month

### LICKING RIVER BASIN

3-2495. LICKING RIVER AT FARMERS, KY.

LOCATION. --At gaging station at bridge on U.S. Highway 60, 300 feet upstream from Chesapeake and Ohio Railway bridge, 0.8 mile west of Farmers, Rowan County, and 1.1 miles upstream from Triplett Creek. DRAINAGE AREA, -- 831 square miles,

September 1949 to August 1950, Water temperatures: October 1949 to September 1963. RECORDS AVAILABLE, -- Chemical analyses:

Sediment records: November 1960 to September 1963. FYREERS, 1962-63. --Water temperatures: Maximum, 79°F Aug. 3-6, 8, 9; minimum, freezing point on many days during January and February.

Sediment concentrations: Maximum daily, 819 ppm May 29; minimum daily, 1 ppm Apr. 27.
Sediment loads: Maximum daily, 15,700 tons Mar. 12; minimum daily, 1 bess than 0.5 ton on many days during October, November, and September.
Satismate Lege-63.—Water temperatures: Maximum, 92.7 July 19, 1951; minimum, freezing point on many days during winter months. Sediment concentrations (1960-63): Maximum, daily, 1,070 ppm June 10, 1963; minimum daily, 1 ppm on several days during December 1960, November 1961, May, June, September 1962, and April 1963.
Sediment loads (1960-63): Maximum daily, 19,700 roors Feb. 28, 1962; minimum daily, less than 0.5 ton on many days. REMARKS.—No temperature record Jan. 28 to Feb. 4; recorded range 32° F. Flow affected by ice Dec. 11, 14-16, Jan. 4-10, 17-31, Feb. 9, 10, 17-19, 25-28.

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

			-					-																						and the same	-
Manak															Day	۸.															Aver-
Month	-	2	က	4	r.	9	1	8	6	1 01	11	12 13	13 14	4 15	91 2	17	18	19	20	21	22	23	24	25	26	27	28	59	30	31	age
October	L						-	-	-	-	-		_	_	_	L	_	_	L												
Maximum	. 62	62	49	69	69	65	65	- 29	67	67 6	99	9 99	67 68	_	69 89	69	6.8	79	62	61	61	9	59	55	52	20	20	2,4	25	25	62
Minimum	. 62	62	62	49	69	69	69	6.5	67 6	9 99	99 99		66 67	7 67	7 68	- 68	9	62	19	61	0,9	5.6	55	52	20	40	60	000	52	25	6.1
Maximum	. 52	52	20	6 7	64	6 4	84	47	47 4	1 8 1	48 48		84 64		48 47	4.7	47	47	47	47	4 7	47	47	47	9 +	4	6,3	7 5	7 7	1	47
Minimum		20	6 7	64	97	48	7 2 4	14	17	47 4	8 7 8 7		48 48		47 47	4.7	47	47	47	47	47	47	2 4	4	4	7	7 7	42	74	ł	47
December		7.7	- 7		- 7	-	0,	ď	7.	<del>-</del>	35		4.6		76 76	45	4	"	4	3.7	0.4	7	7	7	0	2	,7		3.7	37	-5
				1 7	_	39		37				_								5		0.7	7		38	5.7	36		37	37	37
January Maximum	37	35	93	33	33	33	60	93	35	36	98	39	41 40		38 35	33	32	32	32	32	32	3.2	3.2	32	32	32		- 1		1	34
Minimum	_		33	33	33	60		33		-	36 3	38	39 38			32		32		32	_	32	32	32	32	į	1	t i	ŀ	i	34
February				_						_	_	_		_	-						_										
Maximum	1	1	Ì	1	32	35	32	34	34	34	34 3	35 3	35 35		35 35	33	33	33	34	34	35	35	34	34	35	35	35	1	1	ŀ	34
Minimum	:	ł	į.	1	32	32	32	3.2	4.	34	34	35	35 35		35 33	33	33	33	33	96	ņ	33	34	34	35	35	35	i	i	7	34
March	ď	3,6	ď		"		7 7 7	77	5 7	- 47	47	4	07		0 7	4	2		G	5	ď	4	47	7	Ç	5.2	4	2	4	75	7.7
		_	9 (	000			-	. 71		_	-			-						3		47	47	7	0		25	2,4			4
			3	?		?		:						_					_											:	
Maximum	. 56	e)	9	09	09	57	55	5	5.5	55 5	55 5	_	54 5	53 5	52 52	55	58	53	9	62	9	62	61	9	66	59	. 19	9	09	1	58
Minimum		96	58	09		55	5.	53	53	53 5	_	52 5	52 51	_	50 51	1 52	52	58		90	9	61	9	58	57	57	09	9	58	į	96
May						-		_	_	_		_		_													_				
Maximum				09	62	49	_	65		_	_	_		_				_		94		9		63	63	63		4	63	63	49
Minimum	. 57	S.	26	57	20	61	62	62	999	9 89	9 29	9 79	79 79	_	65 65	9 9	63	9	62	63	64	79	29	63	63	63	63	63	63	6 3	29
June							_			_		_				_				-					1				-		
Maximum			99	60		99		7 :								_				7 :		9 .		9 !	2	7	7/		3	ļ	2
Minimum	- 63	94	69	69	65	99	99	9	0	- 0 -	72   71	_	69 71	_	20 20	- 68	69	70	7	65	99	69	65	67	9	0	7.5	- 2	73	;	99

75	75	2,99
77	74	1
76	74	79
76	4 4	60
7.7	74	6.2
7 6	74	59
76	74	62
76	73	79
75	73	64 62
75	73	69
75	72	66
75	7 1	7.0
7 4 7	69	0.8
76	71	69
76	7.1	2.89
77	7.2	70
76	72	0.8
73	73	69
7.1	7.4	0 × 9
72	74	75
72	75 74	73
72	7.7	73
72	7.8	73
73	77	72 71
7.3	77	7.2
72	77	7.2
75	7.5	73
7.5	77	74
76	7.9	77.
76	79	74
76	78	72
75	77	73
July Maximum 75 76 76 75 75 72 72 72 72 72 72 72 72 72 72 75 75 75 75 75 75 75 75 75 75 75 75 75	Minimum 77 78 79 79 79 77 77 75 77 77 75 77 77 77 77 77 77 77	Spermore Spermore Maximum 73 72 74 74 74 72 72 72 72 72 72 73 73 75 76 75 66 66 68 69 70 70 69 69 70 70 69 69 69 69 69 69 69 69 69 69 69 69 69

### QUALITY OF SURFACE WATERS, 1963

### LICKING RIVER BASIN -- Continued

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

S Computed by subdividing day. T Less than 0.5 ton.

### LICKING RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963 -- Continued

		spended sed		I year octo		co petitemper	1903		
		APRIL			MAY			JUNE	
		Suspende	d sediment		Suspen	ded sediment	1	Suspend	ed sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	1060	22	63	466	3	4	2490	154	1040
2 • •	860	15	35	404	4	4	1140	69	212
3	730	13	26	380	3	3	770	38	79
4	665	13	23	350	: 3	3	602	27	44
5	642	9	16	308	3	2	514	23	32
6	558	8	12	284	3	2	462	17	21
7	510	6	8	326	5	4	410	10	11
8	482	7	ğ	338	5	5	541	39	57
9	458	6	7	293	5	4	950	45	115
10	430	6	7	251	5	3	835	168	379
11	386	5	5	215	, 5	3	598	134	216
12.	356	5	5	179	5	2	458	131	162
13	332	4	4	165	5	2	374	47	47
14	311	3	2	167	5	2	323	25	22
15	296	3	2	230	6	4	293	20	16
			_	i					10
16	278	3	2	221	5	3	257	15	10 7
17	266 254	4 5	3	1020 3270	147 270	S 617 S 2490	224 197	11	5
18	245	4	3	2430	221	5 1610	176	9	4
20	239	5	3	1140	73	225	162	9	4
	2.57	_	- (				1	1	
21	233	4	2	705	34	65	206	10	. 6
22	239	5	3	522	21	30	1270	294	5 1490
23	272	6	4	404	18	20	2530	700	4780 S 1300
24	263 239	2	1 1	332 290	16 11	14	2130 785	210	S 1300 163
1	239	2	1	270	111	,	,,,,		102
26	215	2	1	262	10	7	454	43	53
27	200	1	1	254	10	7	326	26	23
28	185	2	1	459	33	5 83	266	20	14
29	154	2	1	5160	819	5 11400	233	17	11
30	287	4	3	6240	450	7580	442	66	S 95
31				4820	198	2580			
otal	11645		256	31885		26787	20418		10418
		JULY		ļ.	AUGUST			SEPTEMBER	
1	510	123	169	182	24	12	50	20	3
2	305	59	48	147	24	10	44	22	3
3	227	39	24	127	24	8	42	27	3
4	191	160	82	90	20	5	52	37	5
5	179	78	38	69	23	4	34	31	3
6	157	41	17	59	20	3	33	36	3
7	132	31	11	50	17	2	32	42	4
8	118	24	8	41	13	1	34	28	2
9	134	20	7	36	18	2	3 B	25	2
10	147	22	9	60	20	3	42	23	3
,,		3.		211	29	24	38	18	2
11	144 111	24	9 6	314 221	42	24 25	33	23	2
12	90	19	5	142	88	34	52	39	5
14.	79	19	4	170	48	22	59	25	4 3
15	69	21	4	162	29	13	69	18	3
,,						7	49	16	2
16	65	21	4	115	24				2
17	61 61	22	4 5	88 69	25	6	55 69	16 15	3
18	53	21	3	61	26	4	52	14	2
20	79	38	8	121	34	11	42	15	2
1									
21	113	25	8	194	27	14	36	14	1
22	160	24	10	188	27	14	32	16	1
23	125	21	7	142	46 57	18 15	27 23	15	1
24	179 242	20 25	10 16	97 75	39	8	20	13	1
1								1	
26	174	23	11	61	30	5	16 14	11	T T
27	118 93	22	7 7	142 115	23 21	6	14	13	÷
29	95 95	28	7	86	20	5	14	14	1
30	170	35	16	65	23	4	12	18	î
31	293	25	20	55	21	3	1		
otal	4679		584	3544	<del></del>	301	1127		66
		1		11 7-7	1	1	11	1	

LICKING RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis B. bottom withdrawal tube; C. chemically dispersed; D. decaration, N. in native water;

	Mothod	jo .	analysis	SBWC	SBN	SBWC	SBWC	SBN		SBWC
			2,000							
			1.000							
		eters	0.500							
		millim	0.250	1	1	1	100	001	1	1
	iment	Percent finer than size indicated, in millimeters	002 0.004 0.008 0.016 0.031 0.062 0.125 0.250 0.500 1.000	100	100	100	6	6	100	100
	Suspended sediment	e indica	0.062	-66	92	86	96	94	66	66
	Suspen	han siz	0.031	94	92	92	94	93	97	86
water)		finer t	0.016	82	98	82	6	88	91	92
etilled		ercent	900 .0	7.1	29	72	8	92	81	87
v, in di		н	0.004	55	43	28	23	53	67	74
ape:			0.002	35	30	45	29	35	53	19
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)	Sodiment	discharge	(tons per day)							
S, sieve; V, vi	Sediment	concen- tration	(mdd)	550	220	820	404	404	1760	843
P, pipet;		Discharge (cfs)		7040	7040	9540	11400	11400	5410	2410
	Water tem-	per-	(°F)							
	00.00	ling per-	point							
		Time (24 hour)		1350	1350	1420	1615	1615	1155	0635
		Date of collection		Dec. 22, 1962	Dec. 22	Mar. 12, 1963	Mar. 13	Mar. 13	May 29	June 23

a Mean discharge based on 365 days; mean discharge for 345 days of chemical analyses, 2,492 cfs.

### LICKING RIVER BASIN--Continued

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

LOCATION. --At gaging station at county highway bridge at McKinneysburg, Pendleton County, 6.5 miles southeast of Falmouth, 9.0 miles upstream from Blanket Creek, and 12.8 miles upstream from South Fork,

CORDS AVAILABLE. -- Chemical analyses: October 1952 to September 1963. Water temperatures: October 1952 to September 1963. RECORDS AVAILABLE. -- Chemical analyses: DRAINAGE AREA. -- 2,326 square miles.

Sediment records: October 1952 to September 1963. EXTREMES, 1962-63.--Dissolved solids: Maximum, 174 ppm Oct. 1-31; minimum, 116 ppm Mar. 1-31.

Specific conductance: Maximum daily, 381 micrombos Nov. 18; minimum daily, 10 micrombos Mar. 15.

Specific conductance: Maximum daily, 30, Aug. 4; minimum daily, 10 micrombos Mar. 15.

Sediment concentrations: Maximum daily, 1,900 ppm June 8; minimum daily, 3 ppm Dec. 7, 8, 11-16, 19.

Sediment concentrations: Maximum daily, 1,1,000 ppm June 8; minimum daily, 3 ppm Dec. 7, 8, 11-16, 19.

Sediment concentrations: Maximum daily, 11,000 ppm June 8; minimum daily, 3 ppm Aug. 2-5, 1963.

Barchess (1925-62): Maximum daily, 10 ppm Nov. 17-20, 1959; minimum, 39 ppm Aug. 2-5, 1963.

Special conductance: Maximum daily, 674 micrombos Nov. 20, 1961; minimum daily, 83 micrombos Mar. 4, 1962.

Special conductance: Maximum daily, 4,230 ppm Peb. 25, 1956; minimum daily, 1, 1 ppm Nov. 10 ppm

		Color	18	1	i	;	ŀ	o		ł	1	;	1	1	I	1		ŀ	1
		띰	8.0		7.8	1	1	7.5		l	ł	1	ŀ	1	!	1		-	ŀ
	Specific conduct-	(micro- mhos at 25°C)	294	270	249	212	206	173		250	225	221	229	256	221	208	-	235	1
	Hardness as CaCO <sub>3</sub>	(residue Calcium, Non- it 180°C) magne-carbon- sium ate	26																
		Calcium, magne - sium	132																
1963	Dissolved	- (0	174	163	141	129	126	116		146	139	129	132	144	124	129		139	870
mper	Z.	trate (NO <sub>3</sub> )																	
o Septe	Fluo-	ride (F)																	
Chemical analyses, in parts per million, water year October 1962 to September 1963	Chlorido	(CI)	14																
year Octol	oulfoto	(SO.)	19																
water	Bicar-	bonate (HCO <sub>3</sub> )	130	1	88	1	1	1		1	i	1	i	;	1	;		-	1
.11on,	Po-	Sium (K)									_								
ts per m1]		(Na)																	
in par	Mag-	sium (Mg)																	
lyses,	Cal-	cium (Ca)																	
cal ans	1	(Fe)	00.00																
Chemi	001110	(SiO <sub>2</sub> )	5.4						_										
	Mean	discharge (cfs)	177	2832	3271	2824	2980	12450		1188	1578	1961	301	374	175	82422		!	1
!		Date of collection	0ct. 1-31, 1962	Nov. 1-30	Dec. 1-11, 16-31	Jan. 1-19, 1963	Feb. 5-28	Mar. 1-31		Apr. 1-30	May 1-31	June 1-30	July 1-31	Aug. 1-31	Sept. 1-30	Weighted average	Time-weighted	average	Tons per day

### LICKING RIVER BASIN--Continued

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

Chemical analyses, in parts per million, water year October 1962 to September 1963 (Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidity)

	ن	Analys∈	es pased	t on max	cimum ar	nd minimu	m month	Th spec	lile con	(Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turblurly)	and max		Outury of	CATRICA	2				
	Mean			Cal-	Mag-	7	-Po-	Bicar-	on the state of	die de	Fluo-	ž.	Dissolved	Hardness as CaCO <sub>s</sub>		Specific conduct-			Tar
Date of collection	discharge (cfs)	(SiO <sub>2</sub> )	(Fe)	cium (Ca)	sium (Mg)	(Na)	Sium (K)		(SO <sub>4</sub> )	(C1)	ride (F)	trate (NO <sub>3</sub> )	20	Calcium, Non- magne-carbon- sium ate	Non- arbon-	(micro- mhos at 25°C)	Hd	Color	bid- ity
Oct. 5, 1962 (maxi- mum conductance).	794	4.1	00.0					114	16	34			. 187	121	28	333	7.9	13	:
conductance)	700	6.3	.19					104	20	5.5			166	110	25	238	7.9	9	1
turbidity)	298	1	1					-	i	ŀ			1	T	!	1	1	1	230
Nov. 18 (maximum conductance)	4160	7.1	.05	, , , , , , , , , , , , , , , , , , , ,				108	24	47			228	134	46	381	7.7	35	ŀ
conductance)	4790	8.8	.07					70	21	11			126	83	26	199	7.4	40	}
turbidity)	12200	1	ł					1	}	1			1	T		1	-	- !	800
Dec. 19 (maximum conductance)	316	7.0	00.					102	27	32			188	122	38	328	8.0	m	ŧ
conductance)	9490	6,3	.05					42	18	5.0			104	54	20	137	7.6	17	ł
turbidity)	10100	1	1					1	}	;			į.	1	1	1	1	1	450
Jan, 11, 1963 (maximum con- ductance)	4450	6.2	.04					86	24	4.0			145	108	28	235	7.7	18	ţ
conductance)	4050	7.1	80.					62	20	8.0			103	70	19	170	7.6	20	1
turbidity)	1	ŀ	ŀ					1	;	;			1	-	!	T	1	1	2000
Feb. 13 (maximum conductance)	3500	7.9	.04					100	58	8.0		_	150	110	28	241	7.6	22	ł
conductance)	5350	7.9	40.					59	19	7.0			107	67	18	165	7.3	30	}
turbidity)	3000	1	1			_		1	;	1			1	1	1	1	1	1	650

1	1	1900	1	1	120	1	1	006	1	ł	1700	1	1	130
15	7	-	83	ß	1	8	7	1	S.	23	1	8	11	-
7.8	7.5	1	7.7	7.4	1	7.6	7.1	1	7.0	7.0	T	7.1	6.9	1
232	104	1	283	223	T	282	132	1	293	110	-	261	158	1
16	10	1	24	19	1	26	0	1	24	18	-	22	16	1
108	41	-	120	104	!	122	55	l	122	46	1	100	09	1
147	80	1	164	141	1	165	102	1	175	83	1	148	66	<del>-</del>
8.0	3.5	1	18	0.9	1	17	5.0	1	25	7.0	-	27	16	
	12	1	28	25	1	59	14	-	22	16	1	16	14	 !
112	38	1	118	104	1	118	89	1	120	34	-	96	54	
.03	.18	i	.01	.01	1	00.	.00	!	00.	.04	1	.01	.04	1
7.8	6.7	1	6.0	13	!	5.3	9.9	1	9.5	7.3	1	3.7	8.4	
3020	16400	19000	615	2720	3960	788	6470	1	1120	6270	3890	302	338	665
Mar. 31, 1963 (maxi- mum conductance)	Mar. 15 (minimum conductance)	Mar. 16 (maximum turbidity)	Apr. 30 (maximum conductance)	Apr. 3 (minimum conductance)	Apr. 1 (maximum turbidity)	May 1 (maximum conductance)	May 31 (minimum conductance)	May 31 (maximum turbidity)	June 24 (maximum conductance)	June 1 (minimum conductance)	June 7 (maximum turbidity)	July 27 (maximum conductance)	July 1 (minimum conductance)	July 21 (maximum turbidity)

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Tur-bid-ity

LICKING RIVER BASIN--Continued

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

Color 40 25 1 10 20 6.9 9.9 6.9 6.7 핌 Specific conduct-337 162 364 168 at 25°C) (microance Chemical analyses, in parts per million, water year October 1962 to September 1963--Continued (Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidity--Continued solids (residue Calcum, Non-at 180°C) magne-carbon-42 19 42 18 ate Hardness as CaCO, 124 118 78 sium Dissolved 197 108 202 98 Ni-trate (NO<sub>5</sub>) Fluo-ride (F) 4.1 6.0 1 Chloride 40 56 <u>ເ</u> Sulfate (SO<sub>4</sub>) 19 77 1 13 17 Bicar-bonate (HCO<sub>3</sub>) 100 9 1 92 74 Po-tas-sium (K) Sodium (Na) Mag-ne-sium (Mg) Cal-cium (Ca) 97: 0.05 ; 0.0 9 Iron (Fe) Silica (SiO<sub>2</sub>) 6.2 4.4 8.2 7.0 ŀ Mean discharge (cfs) 281 576 ł 267 157 mum conductance)..
Aug. 10 (minimum conductance)....
Aug. 10 (maximum turbidity).... Sept. 8 (maximum conductance)......Sept. 20 (minimum conductance)..... Sept. 6 (maximum turbidity)..... Aug. 16, 1963 (maxi-Date of collection

LICKING RIVER BASIN--Continued

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

إ إ	age				
1	ਰ	60 46 36	32	59 64 71	76
	31	88  89	1 1 2	191	73
	30	34	1 1 4	60	917
	29	35	1 1 2	69	75
	28	4 4 6 6 6	32	62 66 74	74 79 65
	27	3 2 4 5	32	65 75	80 73 66
	26	345	32	67	78 73
22	25	3830	32	44 5	77 74 63
196	24	2 4 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 8 4	63	76 76 74 76 64 62
lber	23	57 45 36	32	61 65 70	
pte	22	35 1 63	32	62 70	45
Se	21	62 47 34	33	65	44 68 70
water year October 1962 to September 1963 Day	20	33	1 6 4	59 73	76 70 69
196	19	33	6 8 3	62 64 74	78 75 69
per	18	34	32 44	63	73
cto	17	67 48 32	32 48	58 63 71	76
Day	16	69 46 32	33	53 65	75 27 07
ye	15	6 4 8	32 4	55 64 72	7 4 4 6 9
ate	-	47	32 44	56 63 73	73
	5.	47	32	56 62 72	77 73
of water,	12	67 4.8 	32 44	57 62 72	74 78 74
J.	=	64 49 32	32 4 2 2 3	57 65 72	77
<u>a</u>	10	63 48 33	36	56	77
಄	6	96 36	37 40 40	56 69 69	73
Temperature (°F)	80	63 4 6 4 0	32	57 68 68	77
Sera	_	63 44 39	32	58 64 67	75 78 68
Tem	9	4 5 6 1	999	57	7 4 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	5	62.1	33	57 62 68	74 79 73
	4	0,44	36 13	57 60 67	81
	က	62 47 41	35	59	76
	2	39 66	33	57	717
1	_	5 4 4 1 4 1	8   8	2000	7 4 7 8 6
	Month	October November December	January February	April May June	JulyAugust

### QUALITY OF SURFACE WATERS, 1963

### LICKING RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963

ļ		OCTOBER			NOVEMBE	·	1	DECEMBER	
		Suspend	ed sediment		Suspen	ded sediment		Suspend	led sedimen
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	35	22	2	195	74	39	733	19	38
2	50	32	4	125	44	15	640	15	26
3	469		3 250	106	34	10	57∪	9	14
4	700	156	295	9.0	17	4	51∪	6	8
5	794	75	161	87	17	4	464	5	6
6	428	37	43	89	18	4	450	4	5
7	270	27	20	89	10	2	473	3	4
8	203	27	15	90	7	2	520	3	4
9	178	29	14	713	440	850	51∪	5	7
0	152	32	13	12200	778	5 24703	500	5	7
1	137	26	10	12400	468	15700	7 400	3	<b>ف</b>
2	108	26	8	9840	269	7150	350	3	3
3	96	26	7	4790	139	1800	310	3	2
4	8.5	28	6	2460	90	598	280	3 ]	2
5	79	26	6	1580	63	269	260	3	2
6	78	23	5	1090	42	124	250	1 3	2
7	96	37	10	2200	56	333	267	5	4
8	73	47	9	4160	116	1300	295	4	3
9	66	27	5	6080	146	2400	316	3	2
0	62	19	3	493∪	99	1320	35∪	6	6
1	60	20	3	3570	76	732	3430		E 4500
22	58	16	2	2730	64	472	10100	696	19000
3	56	22	3	2780	49	368	12400	412	13800
4	54	19	3 l	2640	47	335	11900	297	9540
5	52	13	2	2880	46	358	9490	198	5070
6	50	6	1	2400	5.0	324	6520	128	2250
7	50	5 !	1	1630	51	224	3510	87	824
8	50	6	1	1186	43	137	2360	57	363
9	344	1	E 210	975	42	110	5430	380	5 9070
0.0	267	157	113	860	32	74	8490	377	8640
1	298	113	91				7430	190	3810
otal	5498		1316	84959		59758	89508		77015
		JANUARY			FEBRUAR	Y		MARCH	
1	5780	115	1790	700	20	38	5000		E 1300
2	4050	80	875	1000	20	54	8200	495	11000
3	2940	63	500	4000	20	216	8560	440	10200
4	2110	62	353	5500	20	297	10200	454	S 1450U
5	1710	31	143	6000	110	1780	25200	1670	114000
6	1500	19	7.7	5350	209	3020	25000	818	55200
7	1300	1 15	53	4560	164	2020	20300	492	27000
8	1170	14	44	3000	187	1510	15000	295	11900
9	1080	14	41	2500	124	837	11300	245	7470
0	1030	10	28	1500	62	251	8350	185	4170
11	4450	599	5 9950	2300	63	391	7270	470	A 9200
2	5710	552	8510	2700	65	474	11800	841	26800
3	4670	285	3590	3500	84	794	15900	670	28800
4	4280	143	1650	3500	77	728	17200	515	23900
5	3880	88	922	2600	50	351	16400	360	15900
6	2850	114	877	2000	36	194	19000	966	S 5860U
7	2040	85	468	1600	28	121	28900	1170	91300
8	1670	66	298	1400	24	91	25900	544	38000
9	1430	35	135	1400	30	113	22100	850	50 <b>7</b> 00
0	1200	21	68	2500	43	290	20800	735	41300
1	1000	20	54	3000	57	462	17100	263	12100
22	950	20	51	4000	73	788	13000	123	4320
23	900	20	49	4000	90	972	8560	133	3070
24	850	20	46	3500	89	841	5110	109	1500
25	800	20	43	3000	75	608	3640	92	904
26	760	20	41	2300	69	428	3100	83	695
27	740	20	40	2700	52	379	2870	67	519
8 * *	720	20	39	2600	36	253	2630	54	383
9	710	20	38				2400	50	324
30	700 700	20	38 38				2120 3020	51 133	292 1080
/ L	100	- 20	20		+	ļ	3020	1 2 2	1000
otal						18301	385930		666427

E Estimated. S Computed by subdividing day.

A Computed from partly estimated-concentration graph. B Computed from estimated-concentration graph.

### LICKING RIVER BASIN -- Continued

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

Suspended sediment, water year October 1962 to September 1963--Continued

10 21 3 4 5 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 24 22 24 25 26 27 27 28 29 31	Mean dis- charge (cfs)  1960 2720 2210 1870 1680 1780 1780 1780 1880 1280 1190 1190 1100 1040 953 887 782 755 610 575 590 615	Mean   concentration   (ppm)   151   134   759   46   28   27   17   16   12   9   6   5   6   6   7   7   5   6   6   7   7   8   10   10   10   10   10   10   10	Tons per day  1610 1330 1581 274 141 122 70 60 41 29 27 17 13 14 16 13 12 12 13	Mean dis-charge (cfs)  788 1250 1270 1013 8877 758 690 6100 585 555 555 1650 887 758 690 887 887	Mean concentration (ppm)  10 18 21 17 11 11 8 7 7 12 2 9 7 8 8 58 544 244 244	ded S	Tons per day  21 61 72 46 26 17 13 17 14 10 10 9 154 2560 584	Mean dis- charge (cfs)	Mean concentration (ppm)  529 262 166 259 196	dec sediment  Tons per day  8960 8223 1010 1120 662 E 19000 A 18000 A 50000 13600 5770 1730 628 205 127 124
1 2 3 5 6 7 8 9 10 11 12 13 14 15 17 18 17 18 17 18 20 21 22 23 24 25 26 27 28 30 31 Total	dis- charge (cfs)	Mean   concentration   (ppm)   151   134   759   46   28   27   17   16   12   9   6   5   6   6   7   7   5   6   6   7   7   8   10   10   10   10   10   10   10	Tons per day  1610 1330 58C 274 141 122 70 60 41 29 27 17 13 14 16 13 12 12 13 9	dis- charge (cfs)  788 1250 1270 1013 887 788 690 610 598 555 486 492 693 1570 887 555	Mean concentration (ppm)  10 18 21 17 11 11 8 7 7 12 2 9 7 8 8 58 544 244 244		Tons per day  21 61 72 46 26 17 13 17 14 10 19 9 154 2560	dis- charge (cfs)  627U 455U 225U 161U 1250 409U 3890 9810 5080 3190 1780 1780 1780 1070 964	Mean concentration (ppm)   529   262   166   259   196     1700   990   670   360   353   71   525   5	Tons per day  896u 322u 101u 112u 662 E 1900u A 1800u A 50000 13600 5770 1730 628 205
1 2 3 4 7 8 9 10 11 12 13 14 15 16 17 20 21 22 23 24 24 25 27 28 27 28 30 Total	charge (cfs)	concentration (ppm)  151 134 79 46 28 27 17 16 12 9 9 6 5 6 7 6 6 6 7 7 7	per day  1610 1330 580 274 141 122 70 60 41 29 27 17 13 14 16 13 12 12 13 9	charge (cfs)  788 1250 1270 1013 887 768 690 6100 585 555 486 432 633 1570 887	concentration (ppm)   10   18   21   11   8   7   7   12   9   7   8   8   5   5   5   5   4   24   4   24   5   5   5   5   5   5   5   5   5		21 61 72 46 26 17 13 17 14 10 10 9 154 2560	6270 4550 1610 1250 3890 9810 9810 9810 1780 1780 1520 1070 964	concentration (ppm)  529 262 166 259 196 1700 1900 990 670 360 153 71 52	896u 896u 322u 101u 112u 662 E 19000 A 18000 5770 1730 628 205
2 3 4 5 6 7 8 9 11 12 13 14 15 17 18 19 20 22 23 24 24 25 27 28 29 30 31 Total	7680 2720 2720 2710 1870 1680 1580 1280 1190 1100 1040 953 887 755 755 610 575 575 575	151 134 75 46 28 27 17 16 12 9 9 6 5 6 6 6	1610 1330 580 274 141 122 7U 60 41 29 27 17 13 14 16	1250 1270 1010 887 788 690 610 585 555 486 432 693 1570 887 1590 2980 4440	10 18 21 17 11 8 7 12 9 7 7		21 61 72 46 26 17 13 17 14 10 10 9	4550 2250 2250 4093 3890 9810 5080 3190 1780 1520 1070 964	529 262 166 259 196 	8960 3220 1010 1120 662 E 19000 A 18000 A 50000 13600 5770 1730 628 205
2 3 4 5 6 7 8 9 11 12 13 14 15 17 18 19 20 22 23 24 24 25 27 28 29 30 31 Total	7680 2720 2720 2710 1870 1680 1580 1280 1190 1100 1040 953 887 755 755 610 575 575 575	1 134 79 46 28 27 17 16 12 9 9 9 6 5 6 6 6	1930 58C 274 141 122 7U 60 41 29 27 17 13 14 16 13 12 12 12 13 9	1250 1270 1010 887 788 690 610 585 555 486 432 693 1570 887 1590 2980 4440	18 21 17 11 8 7 12 9 7 8 8 58 544 244		61 72 46 26 17 13 17 14 10	4550 2250 2250 4093 3890 9810 5080 3190 1780 1520 1070 964	262 166 259 196 270 1900 990 670 360 153 71	322J 101U 112U 662 E 1900U A 1800U A 5000U 1360U 5770 1730 628 205
2 3 4 5 6 7 8 9 11 12 13 14 15 17 18 19 20 22 23 24 24 25 27 28 29 30 31 Total	7680 2720 2720 2710 1870 1680 1580 1280 1190 1100 1040 953 887 755 755 610 575 575 575	1 134 79 46 28 27 17 16 12 9 9 9 6 5 6 6 6	1930 58C 274 141 122 7U 60 41 29 27 17 13 14 16 13 12 12 12 13 9	1250 1270 1010 887 788 690 610 585 555 486 432 693 1570 887 1590 2980 4440	18 21 17 11 8 7 12 9 7 8 8 58 544 244		61 72 46 26 17 13 17 14 10	4550 2250 2250 4093 3890 9810 5080 3190 1780 1520 1070 964	262 166 259 196 270 1900 990 670 360 153 71	322J 101U 112U 662 E 1900U A 1800U A 5000U 1360U 5770 1730 628 205
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 30 31 Total	2210- 1870- 1680- 1530- 1280- 1190- 1190- 1040- 953- 887- 582- 755- 755- 610- 575- 575- 575- 575- 575- 575- 575- 57	46 28 27 17 16 16 16 5 6 6 7 7 6 6 6 6 7 7	274 141 122 7u 60 41 29 27 17 13 14 16 12 12 12 13 9	1010 887 788 690 610 585 555 486 432 693 1570 887 555 1690 2980 4440	17 11 8 7 12 9 7 8 8 8 58 544 244		46 26 17 13 17 14 10 10 9 154 2560	1610 1250 4090 3890 9810 5080 3190 1780 1520 1070 954	259 196 	1120 662 E 19000 A 18000 A 50000 13600 5770 1730 628 205 127
4 5 6 7 8 9 11 12 13 14 15 17 17 19 22 22 22 22 22 22 22 22 22 23 24 25 Total	1870 1680 1580 1280 1280 1190 1100 1040 953 887 826 782 751 645 610 575 575	28 27 17 17 16 12 9 9 6 5 6 7 7 6 6 6 6 7 7 8	141 122 70 60 41 29 27 17 13 14 16 13 12 12 13 9	887 788 690 610 585 555 486 432 693 1570 887 555 1690 2980 4440	11 8 7 12 9 7 8 8 8 54 244		26 17 13 17 14 10 10 9 154 2560	1250 4093 3890 9810 5080 3190 1780 1520 1070 904	196 1700 1900 990 670 360 153 71 52	662 E 19000 A 18000 A 50000 13600 5770 1730 628 205 127
6 7 8 9 11 12 13 14 15 17 18 19 22 23 24 25 27 28 29 30 Total	1680 1530 1280 1280 1190 1100 1040 953 887 826 762 755 711 670 645	27 17 16 12 9 9 6 5 6 7 7 6 6 6 7 7	122 7u 60 41 29 27 17 13 14 16 12 12 12 13 9	788 690 610 585 555 486 432 693 1570 887 555 1690 2980	8 7 12 9 7 8 8 5 5 4 2 4 4		17 13 17 14 10 10 9 154 2560	4090 3890 9810 5080 3190 1780 1520 1070 904	1700 1900 990 670 360 153 71 52	E 19000 A 18000 A 50000 13600 5770 1730 628 205 127
7 8 9 11 12 13 14 15 17 18 20 22 22 22 22 23 24 25 Total	1530 1280 1280 1190 1190 1100 1040 953 887 82 785 711 670 645 610 575 575 579	17 16 12 9 6 5 6 7 6 6 7 7	7u 60 41 29 27 17 13 14 16 13 12 12 12 13	690 610 585 555 486 432 693 1570 887 555 1690 2980	7 12 9 7 8 8 8 58 544 244		13 17 14 10 10 9 154 2560	3890 9810 5080 3190 1780 1520 1070 964	1900 990 670 360 153 71	A 50000 13600 5770 1730 628 205 127
7 8 9 11 12 13 14 15 17 18 20 22 22 22 22 23 24 25 Total	1530 1280 1280 1190 1190 1100 1040 953 887 82 785 711 670 645 610 575 575 579	17 16 12 9 6 5 6 7 6 6 7 7	7u 60 41 29 27 17 13 14 16 13 12 12 12 13	690 610 585 555 486 432 693 1570 887 555 1690 2980	7 12 9 7 8 8 8 58 544 244		13 17 14 10 10 9 154 2560	3890 9810 5080 3190 1780 1520 1070 964	1900 990 670 360 153 71	A 50000 13600 5770 1730 628 205 127
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 30 31 Total	1380 1280 1190 1100 1040 953 887 826 755 711 670 645 610 575 575 579	16 12 9 9 6 5 6 7 6 6 7 7 7	60 41 29 27 17 13 14 16	610 585 555 486 432 693 1570 887 555 1690 2980	12 9 7 8 8 58 544 244		17 14 10 10 9 154 2560	9810 5080 3190 1780 1520 1070 964	1900 990 670 360 153 71 52	A 50000 13600 5770 1730 628 205 127
9 10 11 12 12 13 14 15 16 17 19 20 22 23 24 22 23 24 25  Total	1280 -1190 1100 1040 953 887 826 782 755 645 610 575 575 579	12 9 9 9 6 5 6 7 7 6 6 6 7 7 5 5 7 8 8	41 29 27 17 13 14 16 13 12 12 13	585 555 486 432 693 1570 887 555 1690 2980 4440	9 7 8 8 58 544 244		14 10 10 9 154 2560	5080 3190 1780 1520 1070 964	990 670 360 153 71 52	13600 5770 1730 628 205 127
10 11 12 13 14 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 30 31 Total	1190 1100 1040 953 887 826 782 755 711 670 645 610 575 575	9 9 6 5 6 7 6 6 6 7 5 7 8	29 27 17 13 14 16 13 12 12 13	555 486 432 693 1570 887 555 1690 2980 4440	8 8 58 544 244 58		10 10 9 154 2560	3190 1780 1520 1070 904	360 153 71 52	5770 1730 628 205 127
11 12 13 14 15 16 17 19 20 22 23 24 24 25 27 28 30 Total	1100 1040 953 887 826 782 755 711 670 645 610 575 575	6 5 6 7 6 6 6 7 7 7	17 13 14 16 13 12 12 13	432 693 1570 887 555 1690 2980 4440	58 544 244 58		9 154 2560	1520 1070 964	153 71 52	628 205 127
12 13 14 15 16 17 19 20 22 22 23 24 25 27 28 27 28 31 Total	1040 953 887 826 782 755 711 670 645 610 575 590	6 5 6 7 6 6 6 7 7 7	17 13 14 16 13 12 12 13	432 693 1570 887 555 1690 2980 4440	58 544 244 58		9 154 2560	1520 1070 964	153 71 52	628 205 127
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 30 31 Total	953 887 826 782 755 711 670 645 610 575 575	5 6 7 6 6 6 7 5	13 14 16 13 12 12 13 9	693 1570 887 555 1690 2980 4440	58 544 244 58		154 2560	1070 954	71 52	205 127
14 15 16 17 18 19 20 21 22 224 225 226 277 28 31 Total	887 826 782 755 711 670 645 610 575 575	6 6 6 7 5 7 8	14 16 13 12 12 13	1570 887 555 1690 2980 4440	544 244 58		2560	954	5.2	127
15 16 17 18 19 20 21 22 223 24 25 26 27 29 30 Total	826 782 755 711 670 645 610 575 575	7 6 6 6 7 5	16 13 12 12 13 9	887 555 1690 2980 4440	58	12	584	782	59	124
16 17 18 19 20 21 22 23 24 25 26 27 31 Total	782 755 711 670 645 610 575 575	6 6 6 7 5 7 8	13 12 12 13 9	555 1690 2980 4440	58		204			
17 18 19 20 21 22 23 25 26 27 31 Total	755 711 670 645 610 575 575 590	6 6 7 5 7 8	12 12 13 9	1690 2980 4440						
17 18 19 20 21 22 23 25 26 27 31 Total	755 711 670 645 610 575 575 590	6 6 7 5 7 8	12 12 13 9	298∪ 4440			87	620	4.2	76
19 21 22 22 23 24 25 26 28 29 31 Total	670 645 610 575 575 590	7 5 7 8	13 9	4440		E	330U	510	31	4 5
20 21 22 23 24 25 27 28 30 31 Total	645 610 575 575 590	7 8	9		340	A	2700	446	23	
21 22 23 24 25 26 27 29 30 31 Total	610 575 575 590	7 8			436	S	5610	386	2.3	24
22 23 24 25 26 27 28 29 30 31 Total	575 575 590	8		5540	549	1	8210	346	17	16
22 23 24 25 26 27 28 29 30 31 Total	575 575 590	8	12	3250	245	S	2290	320	19	16
23 24 25 26 27 28 29 30 31 Total	575 590		12	1640	118	Ĭ	522	306	20	16
24 25 26 27 28 29 30 31 Total	590	6 '	9	1180	71		226	274	17	12
25 26 27 28 29 30 31 Total	615	6	10	920	4.2	1	104	1120	. 38	5 152
27 28 29 30 31 Total		6	10	750	31		63	2480	160	1070
27 28 29 30 31 Total										
28 29 30 31 Total	610	6	10	625	26		44	1750	317	1500
29 30 31 Total	560	4	6	545	21		31	882	150	5 375
30 31 Total	510	5	7	520	20	5	28 285	605 486	124	202 101
1 2	496 615	6	5 10	1360 3950	490	. 5	5880	419	54	61
1				6470	848	-	14800	122	1 22	
1			4494		<del></del>		47789	58996		127842
3	35625		4494	48916			4//09			
3		JULY			AUGUST				SEPTEMBER	
3	338	45	41	760	64		131	398	37	40
3	358	46	44	595	40		64	267	36	26
4	610	48	79	402	46		50	180	3.2	16
	437	38 .	45	302	37		30	138	34	13
5	338	30 ,	27	251	5 7	1	39	113	36	11
۷.	284	26	20	221	66	I	39	804	91	198
7	260	25	18	192	. 50		26	455	63	77
8	248	22	15	167	36	1	16	267	41	30
9	227	21	13	154	85	s	172	185	37 .	18
10	203	20	11	576	945	5	1900	138	38	14
į		· '			!				_	
11	178	17	8	150	210		85	115	33	10
12	169	17	. 8	102	105		29	103	34	9 8
13	178	20	10 11	996 500	516	S	2050 240	95 103	31 39	8 11
14	212 190	17	9	334	178		68	118	37	12
	190	* .	,	334	"		00		1 1	
16	169	20	9 1	281	5.3		40	257	35	24
17	152	23	9	320	4.2	1	36	206	35	19
18	140	26	10	254	36	ĺ	25	185	37	18
19	131	26	9	1050		E	1100	182	36	18
20	353	210 A	200	1110	243	S	807	157	41	17
21	665	116	208	398	128		138	129	43	15
22	486	66	87	281	117		89	118	37	12
23	316	36	31	406	88	i	96	101	33	9
24	281	25	19	382	64		66	87	25	6
25	281	29	22	302	46		38	75	23	5
24	204	27	22	236	30		24	65	23	4
26	306				38 34			59		4
27	302 306	29 32	24 26	182 150	36	ĺ	17 14	52	19 16	2
		30			36	i	11	, 52	16	2
30		26	23 16	136 124	31		11	47	24	3
31	284	73 S		295	. 31	l i	25			
+	284 236	<u> </u>				-			-	
Total	284		1232	11609			7476	5240		650

Method of analysis

SBWC SBWC SBW SBW SBW SBW SBW SBW SBW

LICKING RIVER BASIN--Continued

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

2,000 1.000 0.125 0.250 0.500 Percent finer than size indicated, in millimeters 60000000 Suspended sediment Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: B, bottom withdrawal thus, C, themically dispersed; D, decantation, N, in mattre water; P, pipel; S, sieves; Y, rimal accommission they. W, in distilled water) 062 999 999 999 999 ö 0.031 93 97 95 98 98 97 0.016 88 88 88 88 88 900.0 67 68 67 67 77 80 56 63 57 71 71 65 ö 0.002 55 55 55 55 55 55 Sediment discharge (tons per day) Sediment concen-696 1100 2020 2020 2020 1860 1860 488 tration (ppm) 10400 6050 26500 26500 11300 11300 1070 Discharge (cfs) temper-ature (°F) Water Samp-ling point Time (24 hour) 1100 1300 0945 0945 0900 0900 Dec. 22, 1962 Mar. 11, 1963 Mar. 5 Mar. 5 June 8 June 8 June 13 Date of collection

### LICKING RIVER BASIN--Continued

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

LOCATION.--At gaging station at bridge on State Hihways 356 and 36, at Cynthiana, Harrison County, 0.4 mile downstream from DRIAMGE AREA.--621 square miles.

DRIAMGE AREA.--621 square miles.

RECORDS AFMILHBLE.--Chemical analyses: October 1950 to August 1951.

Water temperatures: October 1949 to September 1963.

EXTREMES, 1962-63.--Water temperatures: Maximum, 82°F July 27, Aug. 1, 6; minimum, freezing point on several days during January EXTREMES, 1996-63.--Water temperatures: Maximum, 87°F June 30, 1952, July 14, 1954; minimum, freezing point on many days REMARKS.--Stream frozen Jan. 27 to Peb. 2.

Temperature (°F) of water, water year October 1962 to September 1963

Month															Day															Ì	Aver-
Month	-	- 2	ر س	5	9	_	8	ъ ж	01 6	= 0	12	13	4	15	91	17	18	19	20	21	22	23	24	25	56	27	88	59	30	31	age
October	-	-	-	_	-	-	-	-	-	-	-	_	_	L	L	L								-	Т	-				-	
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р.ш.		_		_	9 69					_						70		99		63		66	55		47		r 4		46	4 50	63
November		_		_						_		_								į		1	ţ		,	9	5	9	- (	_	0
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January	-					-						_		_								-		,		-				-	,
а.ш	33 3	33		34 3		_	34	_	35 36	_	36 36	34	6	4	60	33	33	34	3.4	33	33	33	33	6	33	53	32	32	32	32	34
D.B.		4.	34	_	35 36		35 36				_					34		35		33		33	33	33	33	32	3.2	(1	32	34	34
rebruary		32	2.2	33	33		33		33		33	8	23	ξ. ξ.	6.	60	33	33	34	33	33	33	33	34	33	33	33	1			33
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а.ш.	34	34	34	-	34 34		34 35		35 36	_	_			_		9	38	39		37		57	35	7	<b>4</b>		5	4	- 4	27	38
D.B.				34 3			35 36		36 36	-	36 38	39	9 38	39	36	33		38	38	37	38	39	7 7	4.5	£ 3	t t	45	64	5.4	20	39
April		_		_		_		_				_		_		_ '		_ :		-			-		_	0					i
а.ш.	49 5	51	54 5	54 5	51 49		49 50	_	51 49			-			40	20	27	79	63	9	63	9	2	26	2.	ų S	9	3	9	1	η 1
p.m.c.				_			51.5		2 20		0 4	7	84	<u>_</u>		57		6		65		90	æ		ر ا	9	79	1	28	!	ç
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June		96	ς 								_							0		8		0	10		0	<b>,</b>		ŧ	,	±	9 0
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n d	65 6	99		_			7.0 7.1	—		14   1	70/7			_		7	-	7.5		2		73	73	74	75	16	77	7.8	- 62		7.1
oury a.m.	707	10	70	7.0		4.	7.6		7 2 7		7.5 7.	_	75 73			7.7		7.9		78	7.9	7.7		7.9	80	80	8	7.8		4	7.7
E 0				_	7 2	_	_	7.6		7.4	74 75		76 74	1 2	4		ď	α	7.0	80		7.8	19	BO	ď	8.2	0	î	83	8	7.8
August	_	_			_	_				_										3		2		3	,	,		,		,	
а.ш.	୍ଷ	96	80	80 7	79 8	80 8	81	80	817	7 9 7	70 79		78 76		7.5	7.2	73		7.2	7.1	20	7.7	7.5	75	73	4	75	16	17	92	92
p.m		_												7.5				7.5		72		4	_	75	7.5	9/		00		,	,
a.m.	75/7	7,4		78 7		76 7	77 7	77 7	787			_	70 76	7.5	73	7.2	7.1	7.0		7.2	72	69	67	99	63	62	6	49	9	1	7.5
E C	75	_	787	_	78 78			-	79.8	80 8	81 80	_	78 76		7.3	7.2	7.2	7.2	73	7.3	7.2	7.0	68	99	49	9.4		9 4	+9	ŀ	73

### GREAT MIAMI RIVER BASIN

3-2631.1. GREAT MIAMI RIVER NEAR TAYLORSVILLE DAM, AT TAYLORSVILLE, OHIO (Formerly published as Miami River near Taylorsville Dam, at Taylorsville)

LOCATION.—At highway bridge on Little York Road, 0.8 mile downstream from Poplar Creek, 0.8 mile south of Taylorsville, Montgomery County, 1.3 miles DRAINSETEME TON gaging station, and 1.5 miles downstream from Taylorsville Dam.
DRAINSET AREA.—In Square miles at gaging station: to make the form the same state of the commercial form the same state.—Changes remained and manageness to rememer 1967 (discontinued) REMARKS.—Camples for iron and manganese filtered clear when collected. Records of discharge are given for Great Miami River at Taylorsville.

Col-1111 150 150 8 128 or 77.9 8.2 8.0 7.8 8.7 8.5 1.888 Ηd 588 701 701 718 753 655 620 575 344 623 645 618 655 To-Specific tal conduct-(micromhos at 25°C) actd- ance as H+1 car-bon-70 72 76 88 98 73 73 56 81 78 60 66 Hardness as CaCO, (residue | Cal-at 180°C) cium, mag-nesium 318 328 334 346 362 324 299 267 159 322 329 311 302 306 409 416 424 441 460 396 391 352 227 390 384 400 389 hos-Dissolved Ni- phor- solids trate us as /\_\_\_\_ 8.6 3.3 15 1.6 8.7 2.1 9.3 .40 6.0 .92 (NO,) PO. 48460 1.8 1.7 3.7 8.6 3 0.6 15 3 2.2 9 ... 88886 11.9 2.4 in parts per million, October 1962 to July 1963 J-onl: 44 | | ride (F) 1111 Chloride (C1) 25 25 20 20 20 30 31 38 38 22 20 25 25 Sulfate (804) 69 68 72 76 85 92 85 71 82 82 76 66 68 73 Co. 00002 00000 0 9 9 0 Bi--uoq ate HCO<sub>3</sub>) 302 311 314 320 334 276 240 236 126 256 302 272 284 284 Lithiun (Li) Pot-tas-sium (K) 7.2 7.2 1.9 2.1 11111 ŀ œ Sodium 11111 (Na) 425.5 Chemical analyses, 14 Mag-ne-stum (Mg) 11111 23 23 31 33 1 232 Cal-cium (Ca) 11111 77 69 78 78 77 Man-ga-nese (Mn) 0.10 112 0.03 0.03 25 13 13 13 13 1488 .18 .51 .21 .26 0.10 Fe) Alu-mi-mum (Al) Discharge Silica (cfs) (SiO<sub>2</sub>) 4.8 4.5 1.0 5.3 11111 260 299 122 145 244 204 204 3270 3340 106 106 82 80 80 90 10, 1962 17..... 24..... 28....1963 14, 1963 13..... June 13.....
July 17.... May 21..... Apr. 16.... collection jo Oct. Oct. Oct. Nov. Nov. Jan. eb. Mar.

a Daily mean discharge,

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GREAT MIANI RIVER BASIN--Continued

3-2631.1. GREAT MIAMI RIVER NEAR TAYLORSVILLE DAM, AT TAYLORSVILLE, OHIO--Continued (Formerly published as Miami River near Taylorsville Dam, at Taylorsville)

Срева	Chemical analyses, in parts per million, October 1962 to July 1963 Continued	s, in par	ts per mi	111on, Octo	ber 1962 to	July 1963	Continue	Pe	
	Dissolved oxygen	oxygen	Orga	Organics	Ammonta				-
Date of collection	parts per million	Percent satu- ration	Phenols as Caugh	Alkyl benzene sulfonate (ABS)	nitrogen as NH4	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbid- 1ty	Threshold
Oct. 10, 1962.	6.3	67	0.016	0.5	0.4	0,05		15	M-1
0et. 17	3.7	39	000	9.	9	.10		6	0
	5.4	20	900	9	4.	10		15	W-8
0ct. 31	7.6	64	.001	9	9	.10		9	G-2
Nov. 7	7.6	63	000	9.	9,	.05		S	E-4
Nov. 28	7.2	59	000	η.	7.	.05		9	0
Jan. 14, 1963	8.1	55	800	6	1.2	10		10	E-4
Feb. 13	8.5	59	.003	4.	1,3	,15		œ	M-4
Mar. 12	9.2	70	.004	27	9.	10		20	0
	10.2	94	.014	ĸ.	ů.	.10		2	0
May 21	0.6	96	.002	8.	0.	.10		10	0
June 13.	7.1	42	000	٠.	٠,	.20		45	0
ly 17	4.6	28	000	4	0	.05		45	0
July 24	5.2	64	000	. 2	.2	.10		30	0

GREAT MIAMI RIVER BASIN--Continued

3-2660. STILLWATER RIVER AT ENGLEWOOD, OHIO

LOCATION. --At bridge on Interstate Highway 70, about 0.8 mile downstream from gaging station, about 1 mile downstream from Englewood Dam, and 1.6 miles southeast of Englewood, Montgomery County.
DRAINGE ARGAL.-def gagare miles at gaging station of the County.
RECORDS AVAILABLE.--Chemical analyses: November 1861 to July 1963 (discontinued).
REMARS.--Samples for Iron and manganese filtered Clear when collected.

1		or or	1	;	;	ŧ	1	1	9	22	30	IJ	80	10	ł	H
-		H <sub>d</sub>	6.7	4.4	7.8	8.3	6.2	8.4	0.8	7.7	7.8	8.4	8.1	8.3	8.0	7.7
	Specific conduct-	ance (micro- mhos at 25°C)	629	623	674	299	688	969	525	206	368	296	624	809	260	572
Ì	Hardness as CaCO <sub>3</sub>	Non- car- bon- ate			42				88						20	
	Hard as C	Cal- cium, mag- nesium			320				260						270	
	Dissolved	ride trate phor-solids (F) (NO <sub>3</sub> ) PO <sub>4</sub> at 180°C) ci	392	379	404	417	416	430	327	315	237	363	386	370	341	340
	Phos-	phor- us as Po.	1,1	1:1	2.2 1.0	1.6	1.4	1,1	.58	1.5	.72	.18			.81	- (
1963	ž	NO <sub>3</sub> )	3.2	1.0	2.2	1.4	3.7	9	20	01	2	7.8	5.2	8.0	4.7	3.7
July	-Juo-	(F)	1	;	ļ	;	;	1	0.5	4.	.2	.3 7.8		۳,	_	;
October 1962 to July 1963	:	Chloride (C1)	20	20	20	22	21		18				18	20	20	22
		Sulfate (SO <sub>4</sub> )	62	09	64	64	64	8	09	54	40	71	64	59	58	26
ion,	å.	ate Co					0		0				0	9	0	0
million,	Bi-	bon- ate HCO <sub>3</sub> )	318	286	330	316	338	320	210	216	146	266	308	284	268	274
s per	ith-	(L)														
n par	Pot-	tas- sium (K)	1	1	1	1	1	1	4.1		_		1.9		1	1
analyses, in parts per	;	(Na)	1	-	!	1	1	!	8.2	10	4.6	9.4	6.6	10	-	1
al ana	Mag-	sium (Mg)	1	1	1	1	!	ŀ	22	22	15	32	32	32	1	1
Chemical	(8)	ctum (Ca)	1	ł	ŧ	ł	!	<u> </u>	63	61	46	73	92	74	1	L I
	Man-	ga- nese (Mn)	0.07	80.	60.	.15	60.	.21	.60	200	.52	10	.17	.03	.22	.18
		Fon (Fe)			60		90.	.20	S.	.27	.64	.16	.16	.24	.12	.16
		Silica (SiO <sub>2</sub> )	1	ŀ	ŀ	1	1	1	5.6	5.1	5.7	4.	1.5	4.2	1	!
		Discharge Silica (cfs) (SiO <sub>2</sub> )	65	64	09	57	57	26	254	111	1940	213	191	122	74	94
	Date	collection	Oct. 10, 1962	oct. 17	Oct. 24	Oct. 31	Nov. 7	Nov. 28	Jan. 14, 1963	Feb. 13	Mar. 12	Apr. 16	May 21	June 13	July 17	July 24

GREAT MIAMI RIVER BASIN--Continued 3-2660. STILLMATER RIVER AT ENGLEWOOD, OHIO--Continued

	- Threshold odor					M-2	Df-128	0	0		M-4	•	0	¥-14	A-2	M-2
ned	Turbid- ity			20	15	15	6	7	120	15	100	01	15	65	32	30
3Continu	Cyanide (CN)															
o July 196	Nitrite (NO <sub>2</sub> )			%	.05	• 05	• 05	.05	.10	01.	.15	.05	.05	.10	10	90
ber 1962 t	Ammonta	nitrogen as NH <sub>4</sub>	0.1	۲.	5.	4.	۲.	8.	æ.	1.5	6.	4.	0.	۳.	4	4
110n, Octo	Organics	Alkyl benzene sulfonate (ABS)	0.3	۳.	.3	4.	4.	۳.	8.	٤.	۲.	٦.	7.	-:	. 2	.2
Chemical analyses, in parts per million, October 1962 to July 1963Continued	Orga	Phenols as C.H. BOH	0.004	000.	.003	.005	000.	.001	900.	000.	.012	.004	000.	000.	000	000.
	oxygen	Percent satu- ration	84	109	29	98	92	09	28	72	64	66	88	7.7	26	61
al analyse	Dissolved oxygen	Parts per million	8.0	10.1	7.2	10.0	11.6	7.5	8.5	9.4	8.4	10.8	8.2	8.9	4.4	4.8
Chemic		Date of collection	Oct. 10, 1962	17.		Oct. 31	Nov. 7	Nov. 28	Jan. 14, 1963	Feb. 13	Mar. 12	Apr. 16	Мау 21	June 13	July 17	July 24

### QUALITY OF SURFACE WATERS, 1963

### GREAT MIAMI RIVER BASIN--Continued

### 3-2660. STILLWATER RIVER AT ENGLEWOOD, OHIO--Continued

Periodic determinations of suspended sediment, April 1960 to July 1963

		Water		Suspended sediment					
Date	Time (24 hr) tem- per- ature (°F)		Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)				
Apr. 5, 1960	1130		161	33	14				
Nov. 1, 1961	1315		89	16	4				
Nov. 9	1340	1	78	4	1				
Nov. 15	1415		82	18	4				
Nov. 22	1430		140	6	2				
Nov. 30	1430	1	159	4	2				
Feb. 14, 1962	1545	Ì	260	2	1				
Feb. 26	1700		4260	704	8100				
Feb. 28	1250		6240	130	2190				
Apr. 18	1145	ļ	227	15	9				
May 16	1520		159	16	7				
June 13	1330		222	92	55				
June 27	1430	1	69	40	7				
July 18	1520		301	46	37				
July 23	1110	1	2310	94	586				
Aug. 1	1030	1	168	66	30				
Aug. 8	1050	i	222	86	52				
Sept. 12	1550		50	31	4				
Sept. 19	1830		53	32	4				
Sept. 26	1500		46	28	3				
Oct. 10	1400		65	34	6				
Oct. 31	1430	1	57	14	2				
Nov. 7	1100	1	57	6	1				
May 16, 1963	1445	l	195	22	12				
May 21	1400	1	161	60	26				
July 17	1430		74	32	6				

GREAT MIAMI RIVER BASIN--Continued

## 3-2700. MAD RIVER NEAR DAYTON, OHIO

LOCATION, --At bridge at gaging station on State Highway 444, about 600 feet downstream from Huffman Dam, 6 miles northeast of Dayton, Montgomery County, ARMANAGE ARASAL-652 square miles.
RECORDS AVAILABLE.--Chemical analyses: November 1961 to July 1963 (discontinued).
REMARKS.--Samples for iron and managanese filtered clear when collected.

-		Col-		ļ	1	1	;	ł	20	20	11	ß	ď	,	9	i	1
	у На			7.8	7.6	9.7	6.2	8.0	8.0	8.2	6.7	8.1	1		8.1	6.7	7.7
	Specific conduct- ance (micro- mhos at 25°C)			697	725	718	701	733	618	678	826	689	27.0	5	969	672	299
						_								_		_	4
			8	00	105	22	96	86	96	86	94	86	-	2	88	81	35
	Hardness as CaCO3	Non- car- bon-															
	Har as (	Cal- cium, mag- nesium	358	356	371	369	356	382	310	357	370	369				340	
	ssolved solids esidue 180°C)			424	440	444	426	448	382	421	205	424	497	14	438	422	415
	hos-	0 a i	2.2	2.2	6.3	2.4	2.4	1.2	.62	.88	1.7	.70	-		=	1.8	8.1
963		Q Q		8.6	0	<del>:</del>	-	9.8	6.9	•	6.5	5.8		<u>.</u>	6.5	7.5	9.7
1y 1		ride trate us (F) (NO <sub>3</sub> )	10	1	-	-	-	1	0.2	.5	e.	ε.	-	?	ო.	7.5	-
o Ju			-		_	_			_	_				_	_	_	$\dashv$
1962	Chloride (C1)			20	24	23	20	19	20	18	09	16	9	9	20	20	20
million, October 1962 to July 1963	Sulfate (SO <sub>4</sub> )			81	82	98	81	86	79	80	84	87	10	0	81	78	11
ton,	Car- bon- ate (Co,)				_	_			_	_	_	_		_		_	
mi11	Bi- car- bon- ate (HCO <sub>3</sub> )			312	324	320	316	346	260	316	336	330	200	2	334	316	314
s per	Lith- ium (Li)																
part	Pot-	tas- sium (K)	1	1	ŀ	1	1	1	3.1	2.5	5.6	1.9	,		2.2	!	1
Chemical analyses, in parts per	;	Sodium (Na)	-	1	1	Ī	1	1	12	10	38	9.7	11	:	12	!	1
l anal	Mag-	sium (Mg)	1	;	ļ	1	1	1	88	34	33	35	ě	5	34	1	1
emica	721.	cium (Ca)	1	1	1	1	!	1	18	87	94	06	g t	3	68	;	1
ទ	Man-	ga- nese (Mn)	0.07	.07	90.	60.	80.	.10	.12	.17	.11	.20	ď		.15	.41	.16
	-	(Fe)	0.12	.13	.14	.15	.10	.18	.15	.23	91.	.25	96	2	. 25	.15	.25
	Alu-	mum (Al)															
			1	;	1	1	1	f	7.2	8.0	5.5	2.0	or c		7.2	1	1
		Discharge Silica (cfs) (SiO <sub>2</sub> )	238					266	210	440	256	401			_	216	
	Date	olection	Oct. 10, 1962	Oct. 17	Oct. 24	Oct. 31	Nov. 7	Nov. 28	Dec. 12	Jan. 14, 1963	Feb. 13	Apr. 16	Wew 91	May 21	June 13	July 17	July 24

GREAT MAIMI RIVER BASIN--Continued

3-2700. MAD RIVER NEAR DAYTON, OHIO -- Continued

penu	-	Turbid- Threshold 1ty odor	00 4 4 0 0 0 4 0 0 0 4 0 0 0 0 0 0 0 0	2 0 30 0 10 M-2 3 M-1	6 E-4 25 M-2 20 M-2
Chemical analyses, in parts per million, October 1962 to July 1963Continued		Cyanide (CN)			
		Nitrite (NO <sub>2</sub> )	0.25 .20 .20 .20	.20 .15 .25	255
	o t d Camera	nitrogen as NH,	9.1 4.7.1		446
	Organics	Alkyl benzene sulfonate (ABS)	0.5 6.7.7 6.0		4.6.4
rts per m		Phenols as Caugon	0,013 ,000 ,018 ,004	.007 .006 .006 .000	000.
ses, in pa	oxygen	Percent satu- ration	51 66 51 51	64 58 70 70	80 79 43
ical analys	Dissolved oxygen	Parts per million	4.0.4.0.0 0.4.0.0	1.88.68.7 4.89.7 8.48.88	7.8
Chemi		Date of collection	0ct. 10, 1962 0ct. 17 0ct. 34 Nov. 7	Nov. 28. Dec. 12. Jan. 14, 1963. Feb. 13.	May 21. June 13 July 17

### GREAT MIAMI RIVER BASIN--Continued

### 3-2700. MAD RIVER NEAR DAYTON, OHIO--Continued

Periodic determinations of suspended sediment, November 1961 to July 1963

		Water	-	Suspended sed ment					
Date	Time (24 hr) tem- per- ature (°F)		Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)				
Nov. 1, 1961	1115 1230 1045 1130 1100 1525 1115		252 247 275 301 367 500 880	4 3 2 1 2 42 47	3 2 1 2 2 57				
Jan. 17.  Feb. 14. Feb. 26. Feb. 28. Mar. 14. Apr. 18. May 16. June 13.	1130 1445 1115 1115 1100 1110		513 4550 3130 1300 454 296	8 1320 238 64 8 5	11 16200 2010 225 10 4				
June 27 July 18. July 25. Aug. 1. Aug. 8. Sept. 19. Sept. 26.	1100 1130 0950 0930 0930 1130 1130		211 215 271 203 211 211 203	14 31 46 24 15 18	8 18 34 13 8 10 5				
Oct. 10. Oct. 24. Nov. 7	1030 1115 1010 1045 1130 1230		233 195 195 359 216 225	15 3 2 22 52 44	9 2 1 21 30 27				

GREAT MIAMI RIVER BASIN -- Continued

3-2715. GREAT MIAMI RIVER AT MIAMISBURG, OHIO (Formerly published as Miami River at Miamsburg)

LOCATION.--Temperature recorder at gaging station, 600 feet downstream from bridge on State Highway 725 at Miamisburg, Montgomery County, and O.3 mile downstream from Bear Creek.

PARIANCE NEX.--2.718 square miles.

RECORDS MYAIABLE.--Water temperatures: October 1959 to September 1963.

RECORDS AVAIABLE.--Water temperatures: Maximum, 91°F July 27, 28; minimum, 34°F Mar, 4-8.

EXTREMES, 1962-63.--Water temperatures: Maximum, 91°F July 27, 28; minimum, freezing Foint Jan. 10, 11, 15-17, 1962.

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

	-1	Ð												
	Aver	age	70	53	4 4 4	43	44	43	57	70	83 78	83	818	90 76
Ī		31	0,9	11	41 38	43	11	54	11	70	11	0.5	7.9	11
		30	69 59	53	42	2 4 5	11	53	58	70	8 8 8 9	9,6	80	7.3
		29	58	53	45	39	11	53 51	63	22	8 9	89	84 82	75
		28	58	51	4 4 6 3	39	47	51	59	72	8 8 9	91	82	77
1		27	57	51	4 4 6 4	43	44	4 4 0 80	60	74 70	8 4	91	82 76	77
		26	59 57	4 6	42	43	44	4 9 4 8	57	74	83	98	82	76
		25	59	4 4	41	36	43	4 8 4 5	5.5	73	86 78	9 4 8	84 80	74
		24	64	0 4 0 8	4 2 4 0	37	43	45	52	72	84 76	80 80	818	74
		23	69	50 48	46	42	42	39	58	71	83 76	87	79	75
		22	70	52	4 6 4 6	43	407	3.9	64 58	71	82 75	86	82 76	78
aph		21	7.1	50	4 6 4 6	41	46	39	64	72	82	88	78	82
nogr		20	72	50	0 4 0 8	43	6 4 9	44	63	73	81	90	78	83
thermograph		19	73	51	4 8	4 4 8 3	45	2.4 4.4	67	73	8 0 0 8	98	8174	83
		18	74	55	4 9	43 41	4 5 4 5	44	67	7.1	986	98	82	82
nate		17	77	55	4 4 4 3	39	4 5	44	62	70	783	90.00	82	90
-act	Day	16	78	56	4 4 4	3.9	44	42	59	70	82	86	82	79
alcohol-actuated		15	77	55	4 4 6 4	38	4 0	39.	60	69	82 76	85	83	78
alco		14	77	53	40	3.8	43	4 7 7	5.9	69	82	83	83	77
		13	78	52	0 7	39 36	43	4 7 4 0	60 58	63	81	86	83	81
ethyl		12	78	52	410	39	43	40 36	58	66	80	986	83	83
Continuous		=	76	54	38	4 9 4 3	41	36	59	72	985	84	88	83
tin		2	75	58 54	3.8	50	3.9	3.6	5.8	75	86 83	85	8 48	83
Con		6	73	58	47	8 <del>4</del> 4 6 6 9	39	35	5.08	76	8 3	87	88	7.9
		œ	73	58	4 4 4 4 5	4 t 6	39	35	56	72	84 79	85	8 8 4	83
		7	73	57	47	4 4 5 5	43	34	57	7.1	79	86	90	81
		9	73	58	51	4 t 6	4 5	34 34	56	69	75	8. 8.1.	8 8	8176
		S	72 70	58	53	4 6 4 5	44	34 34	57	65	77	86	88	81
		4	7.2	61 58	53	4 t	3.8	43	60	66	76	87	90	81 79
		က	72	61 59	6.4	4 4 5 7	3.8	44	60	63	76 73	88	90	82
		2	7.1	69	54	4.1	49	4 4 9	59	958	76	89	88	81
L			7.1	60	54 52	3.8	44	39	57	58	74	88	98	83
			11		: :	::	; ;	: :		11	1 1	11	11	::
	Month	Month	October Maximum Minimum	Maximum	Maximum Minimum	January Maximum Minimum	Maximum	Maximum Minimum	April Maximum Minimum	Maximum Minimum	Maximum	July Maximum Minimum	Maximum Minimum	September Maximum Minimum

3-2716. GREAT MIAMI RIVER NEAR MIAMISBURG, OHIO (Formerly published as Miami River near Miamisburg)

LOCATION .--At Chautaqua Road Bridge, about 2 miles south of Miamisburg, Montgomery County, off old U.S. Highway 25, and 2.5 miles downstream from

gaging station
DANIMOR AREA - 7.118 genare miles at gaging station.
RECOND AVAILABLE --chemical analyses: November 1963 to September 1963.
RECOND AVAILABLE --chemical analyses: November 1964 to September 1965 to chemical analyses collected weekly, October and November, July to September; monthly, January to June. Records of discharge are given for Great Minan River at Minanisburg.

		-los			1 1		1				œ			1		18			1		ł		1
		Hd	7.3	5.5	4.7	7.5	8.0	8.2	7.9	7.7	8.0	7.8	6.	7.5	7.7	7.9	7.9	7.7	7.7	7.6	7.3	7.4	7.5
	To-Specific tal conduct-	ance (micro- mhos at 25°C)	736	776	751	192	757	652	107	382	069	686	702	734	687	772	754	677	751	815	834	812	837
	To- tal	actd- ity as H+1																					
	Hardness as CaCO3	Non- car- bon- ate			88						84				99						75		
		Cal- cium, mag- nesium			334			311							299					342			
1963	Phos-Dissolved	trate us as (residue (NO <sub>3</sub> ) Po <sub>4</sub> at 180°C)	437	459	466	462	458	401				_		448	415	470	450	408	449	490	496	494	203
Per	hos	phorius as (Pot a	5.5		2 2	6.0	4.0	2.9	3.4	.62	2.7	2.1	2	3.9	3.6	3.8	3.9	4.2	3.2	3.4	3,3	8.8	4.2
September 1963	į. Ž	(NO.)	8.9	0.0	0.00	8.6	12	12	91	13	8 C	6,9	8	1.5	6.4	2.5	٦.	3.4	2.2	2.6	1.8	1.0	7.5
2 to S	Fluo	ride (F)	1	1			1	9.0	9.	~!	9.	4.	۰.	1	1	1	1	ł	ł	1	1	1	1
million, water year October 1962 to	:	(C1)	36	30	300	38	30	28	49	14	59	31	30	38	36	48	41	40	46	20	53	26	22
year Oct		(SO <sub>4</sub> )	84	8 5	88	88	86	83	82	47	87	77	42	88	80	98	92	80	98	66	102	86	100
ter		g # g									_					_	_	_			_	_	_
n, wa	Bi-		282	308	300	296	314	270	260	146	296	294	305	300	282	308	300	270	308	324	330	308	326
1110	T.ith.	E. C.				_											_						
per m	Pot-	sium (K)	1		!!	1	1	3.4				_		1	!	1	1	1	1	ł	1	1	1
Chemical analyses, in parts per	;	Na)	1	!	1 1	1	¦ 	18	36	7.0	53	73	23	!	!	!	1	1	!	!	-	!	1
ses,	Mag-	sium (Mg)	1	1		!	1	59	22	14	32	32	34	1	ŀ	;	!	1	1	1	į	į	1
analy	Cal-		1				1	77	7.7	47	78	92	75	1	1	l	1	1	1	1	ł	!	1
ical	Man-	ga- nese (Mn)	21.0	61:	119	14	10	.30	.63	30	.07	14	.05	.30	.18	.27	.28	.18	.23	.29	.20	17	14
Chen		(Fe)			9 5			.27	.35	.35	.14	Ξ.	.39	.20	91.	18	.17	.14	.31	.17	.17	.22	.17
	Alu-	- mi ( <b>A</b> l)																					
			1	1	1 1	ŀ	1	6.0	7.4	5.3	1.7	5.6	5.4	1	ŀ	1	1	1	1	1	1	I	1
		Discharge Silica (cfs) (SiO <sub>2</sub> )	499	450	422	450	402	1130	651	8890	1190	920	873	535	10400	416	190	428	322	298	280	280	234
	Date	collection	Oct. 10, 1962	0ct. 17	Oct. 31	Nov. 7	Nov. 28	Jan. 14, 1963	Feb. 13	Mar. 12	Apr. 16	May 21	June 13	July 17	July 24	July 31	Aug. 7	Aug. 14	Aug. 28	Sept. 5	Sept. 11	Sept. 18	Sept. 24

GREAT MIAMI RIVER BASIN--Continued

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

		Threshold odor	K-16 E-12 C-16	C-16 M-16	C-32 C-32 C-8 C-16 C-16 M-16	C-16 C-32 C-32 C-32 C-32 C-16	M-4 M-4 C-16 C-8
tinued		Turbid- ity	820 820 820 820 820 820 820 820 820 820	8 8 8	25 35 75 15 15	25 15 10 15 20	30 20 20 20
. 1963Con		Cyanide (CN)					
September		Nitrite (NO <sub>2</sub> )	0.25 .20 .20	10	15 25 30 30 50 50	1.5 .50 1.0 2.0 .50	2.0 .90 1.5
ser 1962 to	Ammonta	nitrogen as NH <sub>4</sub>	4.5.2.	1.6	8.1.1	# 0 0 0 0 0 F	22.3
year Octol	ıics	Alkyl benzene sulfonate (ABS)	0	0.8	ယ်ထံပော်ထားလုံလုံ	ထွက်ပုံထွဲထွဲထုံ	1.0
ion, water	Organics	Phenols as C <sub>6</sub> H <sub>B</sub> OH	0.017	.002	.005 .016 .010 .024 .007		.020
s per mill	oxygen	Percent satu- ration	1274	15 46	51 59 44 58 58	144 144 88 84	20 11 10 10
s, in parts	Dissolved oxygen	Parts per million		1.6	C 0 C 4 C 4	211.06.69	0.1
Chemical analyses, in parts per million, water year October 1962 to September 1963 Continued		Date of collection	Oct. 10, 1962	Nov. 78	Jan, 14, 1963. Peb, 13. Mar, 12. Apr. 16. May 21. June 13.	July 17. July 24. July 24. July 31. July 31. Aug. 14.	Sept. 5

VER BASIN 175

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

Periodic determinations of suspended sediment, November 1961 to July 1963

Torrodre de terminacions or		Water	, .		ed sed ment
Date	Time (24 hr)	tem- per- ature (°F)	Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)
Nov. 1, 1961	1600		769	23	48
Nov. 9	1610	1 1	814	24	53
Nov. 30	1200		1010	34	93
Feb. 14, 1962	1300		1550	22	92
Feb. 28	1730		19700	220	11700
Mar. 14	1215	i i	12000	142	4600
Apr. 18	1015		1310	8	28
June 13	1110		700	38	72
June 27	1200		471	20	25
July 18	1220		958	38	98
July 25	1320		1150	77	239
Aug. 1	1220		550	14	21
Aug. 8	1235		558	14	21
Aug. 22			429	34	39
Sept. 19	1230		422	24	27
Sept. 26	1220		354	32	30
Oct. 31	1145		415	29	32
Nov. 7	1235		450	8	10
July 17, 1963	1230		520	18	25
July 24	1330		644	20	35

## 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.—-3,140 square miles, approximately.
RECORDS AVAILABLE.—-Chemical analyses: July to September 1963.
REMARKS.—-Samples are collected on a weekly basis July to November and monthly from December to June. Samples for iron and manganese were filtered clear when collected. No discharge records available.

1		col-		18							
ſ		Hd.					7.6	7.6	7.5	7.4	7.6
	Specific	ance micro- phos at 25°C)	ì	752	762	703	160	785	819	808	839
Ī	- 32 0	Acid- ity as H+1									1
	Hardness as CaCO <sub>3</sub>	Non- ity (1 car- as n bon- H+1	ate				99			65	
		Cal- ium nag-	mesium	330						323	
		(residue at 180°C) c		466		•	_	475	488	483	216
	Phos	as PO		2.8	3.8	2.9	3,3	3.2	3.0	3.1	2.1
1963	ž	ride frate us (F) (NO <sub>3</sub> ) as PO <sub>4</sub> a		5.5	2.7	5.7	4.3 3.3	4.5	3.5	1.8 3.1	.7
per	Fluo-	F)									
Chemical analyses, in parts per million, July to September 1963		Chloride (C1)		40	44	37	46	46	20	49	58
n, July	;	ate (SO <sub>4</sub> )		88	06	83	25	87	86	94	96
111	, Š	8 # 8		2		00	0	"0	10	-	
er m	Bi-	Pon-		31	ã	28	310	320	326	314	32
rts p	Litth-	(LI)									
in pa	Po-	sium (K)									
alyses,	:	(Na)									
cal an		sium (Mg)									
Chemi	[a]-	Cium (Ca)									
	Man-	ga- nese (Mn)		0.13	.21	60.	.10	_		_	-4
		(Fe)		0.14	.17	.15	.16	11.	.61	.16	.14
	Alu-	(SiO <sub>2</sub> ) num									
						_					
	M M	discharge (cfs)									
	Date	of		July 31, 1963	Aug. 7	Aug. 14	Aug. 28	Sept. 5	Sept. 11	Sept. 18	Sept. 24

Chemical analyses, in parts per million July to September, 1963--Continued

	Dissolved oxygen	oxygen	Orga	Organics	Ammonia				
Date of collection	Parts per million	Percent satu- ration	Phenols as C.HgOH	Alkyl benzene sulfonate (ABS)	nitrogen as NH.	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbid- ity	Threshold
July 31, 1963,	2.7	36	910.0	9.0	1.2	09.0		7	C-4
Aug. 7	6.	12	.002	œ.	1,7	1.0		9	M-8
Aug. 14	1.2	15	002	9.	1.5	30		7	E-4
Aug. 28	1,3	16	900.	9.	1.9	09.	•	00	M-4
Sept. 5	1.0	12	.001	∞.	2.4	1.0		9	M-16
Sept. 11	4.4	57	.004	φ.	2.0	.80		15	Cs-8
Sept. 18	1,2	15	.017	∞.	2.0	1.5		10	8-5
Sept. 24	3.6	42	.018	1.0	1,2	. 80		15	V-32

# 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. DRAINGE AREA.--3.00 square analys seproximately as RECORDS AVAILABLE. --Chemical analyses: July 760 September 1963. RECORDS AVAILABLE. --Chemical analyses: July 760 September and monthly from December to June. Samples for iron and manganese were filtered clear When Collected. No Adscharge Feerords available.

		Col-	16							
		Hď	7.6	9.7	7.4	7.5	7.1	7.1	7.1	7.6
	To-Specific	ance (micro- mhos at 25°C)	794	821	717	792	854	890	914	867
	To- tal	acid- ity (								
	Hardness as CaCO3	Non- car- bon- ate				125			164	
		Cal- cium mag- estun			298				356	
	Phos-Dissolved	solids (residue at 180°C)			453				584	
	Phos-	us ()	0.20	13	11.	2.4 .08	. 10	14	90.	30
963	ž	ride trate P	1.7	1.6	2.6	2.4	1.5	1.7	9.	0.
er 1	100	ride (F)								
Chemical analyse", in parts per million, July to September 1963		Chloride (Cl)	44	46	42	46	20	57	61	62
n, July		Sulfate (SO <sub>4</sub> )	140	178	127	145	183	188	196	115
1110		Co.)	80	9	9	₩.	œ	4	#	4
er mi	Bi-	bon- ate (HCO <sub>3</sub> )	25	21	22	244	228	24	23	뜑
ts p		(L1)						_	_	
n pa	Po-	tas- sium (K)								
lyse,	;	Sodium (Na)								
alana	Mag-	sium (Mg)								
Chemic		clum (Ca)								
	Man-	ga- nese (Mn)	0.18	.19	.24	11.	.23	.34	.21	.15
		Fe)	0.40	.65	.67	.44	.26	.35	.26	.49
	Alu-	A) H (A)								
		Silica mi- (SiO <sub>2</sub> ) mum (Al)							_	
	Mean	discharge (S (cfs)								
		of	July 31, 1963	Aug. 7	Aug. 14	Aug. 28	Sept. 5	Sept. 11	Sept. 18	Sept. 24

Date of collection   Parts   Percent   Phenols   Parts   Percent   Phenols   Parts   Percent   Phenols   Parts   Percent   Parts   Percent   Phenols   Parts   Percent   Phenols   Parts   P	Chem	ical analys	ses, in pa	rts per mi	llion, July	Chemical analyses, in parts per million, July to September 1963 Continued	er 1963C	ontinued		
Parts         Percent phenols         Alkyl allion ratio         Alkyl allion         Alkyl		Dissolved	oxygen	Orga	nics	Ammonta				
4.5 5.9 0.000 0.6 0.8 0.25 30 115 15 15 15 15 15 15 15 15 15 15 15 15	Date of collection	Parts per million	Percent satu- ration	Phenols as C4Hg0H	Alkyl benzene sulfonate (ABS)	nitrogen as NH.	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbid- ity	
4.0     52     .000     .6     2.0     .30     15       4.3     52     .001     .6     1.3     .35     15       4.3     52     .011     .6     2.3     .39     8       3.2     3.8     .071     .8     2.2     .40     19       5.6     69     .017     .9     1.5     .25     15       5.0     5.0     .000     1.0     2.6     .20     8	ly 31, 1963	4.5	59	0.000	9.0	8.0	0.25		30	C-4
5.7 70 .000 .6 1.0 .35 15 15 15 5.2 .011 .6 2.3 .30 8 8 8 8 8 9.01 .9 1.5 .30 8 8 9.0	3. 7	4.0	25	000.	9.	2.0	.30		15	M-8
4.3     52     .011     .6     2.3     .30     8       3.2     38     .021     .8     2.3     .40     10       5.6     69     .017     .9     1.5     .25     15       3.6     43     .006     .9     3.2     .10     6       5.0     56     .000     1.0     2.6     .20     8	5. 14	5.7	20	000.	9.	1.0	.35		15	M-4
3.2 38 .071 .8 2.2 .40 10 5.6 69 .017 .9 1.5 .25 15 3.6 43 .006 .9 3.2 .10 6 5.0 56 .000 1.0 2.6 .20 8	5. 28	4.3	52	.01	9.	2.3	.30		80	M-2
5.6 69 .017 .9 1.5 .25 15 15 5.6 5.0 5.0 1.0 2.6 2.0 8	ot. 5	3.2	38	1,00,	œ.	2.3	.40		10	¥-8
3.6 43 .006 .9 3.2 .10 6 5.0 5.0 .000 1.0 2.6 .20 8	ot. 11	5.6	69	.017	6.	1.5	.25		15	Cs-8
24 5.0 56 .000 1.0 2.6 .20 8	ot. 18	3.6	43	900.	6.	3.2	.10		9	M-8
	ot. 24	5.0	56	000.	1.0	2.6	. 20		œ	M-4

3-2740, GREAT MIAMI RIVER AT HAMILTON, OHIO (Formerly published as Miami River at Hamilton)

LOCATION.--Temperature recorder at gaging station, 1,000 feet downstream from Columbia Bridge at Hamilton, Butler County, and 3 miles downstream from Four Mile (revised) Creek.

BRIORDS ARRA,--3,639 square miles.

RECORDS ARIALIARE.--Chemical analyses: October 1950 to September 1951.

RECORDS ARIALIARE.--Chemical analyses: October 1950 to September 1957 to September 1963.

EXTREMES, 1962-63.--Water temperatures: Maximum, 93°F Aug. 47°F Mar. 4-7.

EXTREMES, 1950-61, 1957-63.--Water temperatures: Maximum, 93°F Aug. 23, 24, 1959, Sept. 2, 1960; minimum, freezing point on several days during Docember 1950, January and February 1951.

Temperature (°F) of water, water year October 1962 to September 1963

# 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.

DALIMAGE AREA.--5.60 square miles; 5.695 square miles at gaging station.

RECORDS AVAILEBLE.--CHEMICAL RAMINSTON: OF September 1865.

REMINSTS.--Standblag are collected on a weekly basis July to November and monthly from December to June. Samples for iron and manganese were filtered clear when collected. Records of discharge are given for Great Minan Niver at Hamilton.

Chemical analyses, in parts per million, July to September 1963

	or -	16							
	Hd	8.0	7.8	7.5	7.6	7.6	7.4	7.3	7,3
To-Specific tal conduct-	ance (micro- mhos at 25°C)	777	792	100	765	832	850	863	878
To- tal	ity as as H+1								
Hardness as CaCO3	Non- car- bon- ate					106			
	Cal- cium, mag- nesium				320				
Dissolved	boy at 180°C) c	,		•	480				
Phos-	us as PO <sub>4</sub>	0.16	38	.17	.22	.36	.26	.41	.20
ž	(NO NO	4.9	1.4	8.0	2.5	1.8	2.1	1.4	.3
F	ride (F)								
	Chioride (C1)	43	46	41	44	52	53	28	55
	(SO.1)	150	149	128	119	123	138	120	168
	0 st 0		_				_	_	
Bi-	ate (HCO	238	238	214	270	298	286	310	526
Į.	(L)								
Po-	tas- stum (K)	L							
;	Sodium ta (Na) siu								
Mag-	sium (Mg)								
	cium (Ca)								
Man-	ga- nese (Mn)	9				.16	_		
	(Fe)	0.23	.44	.39	.34	.23	.30	.28	.23
Alu-	mum (Al)			-			_	_	
	(SiO <sub>2</sub> ) mum (Al)	L							
Mean	discharge (cfs)	521	414	654	404	389	346	323	275
Date	of	July 31, 1963	Aug. 7	Aug. 14	Aug. 28			Sept. 18	Sept. 24

Chemical analyses, in parts per militon July to September, 1963Continued	Dissolved oxygen Organics Ammonda	Parts Percent Phenols Alkyl benzene per satu- as sulcate million ration CeHgOH (ABS)	. 8.3 109 0.010 0.5 0.4 0.35 25	. 5.0 66 .000 .6 1.8 .50 8	. 4.9 61 .000 .6 1.5 .50 15	. 4.6 58 .000 .6 2.0 .60	4.4 54 .018 .7 2.4 .70 4	4.0 49 .014 .8 1.5 .70 15	3.8 46 .010 .9 2.3 .50 10	4.1 47 .011 .9 2.7 .50 20
al analyses, in parts per		Percent satur ration	109	99	61	28	54	49	46	47
Chemica	a	Date of collection	July 31, 1963	Aug. 7	Aug. 14	Aug. 28	\$ept. 5	Sept. 11	Sept. 18	Sept. 24

3-2766. GREAT MIAMI RIVER AT ELIZABETHTOWN, OHIO (Formerly published as Miami River at Elizabethtown)

LOCATION. --At Lost Bridge on Lawrenceburg Road, 0.6 mile southeast of Elizabethtown, Hamilton County, 0.9 mile downstream from Whitewater River, and

5.4 miles upstream from mouth.
DRAINAGE AREA.--5,385 square miles (at mouth).

RECORDS AVAILABLE "-Chemical analyses: October 1986 to September 1963.

EXTREMES, 1962-61.—Chemical analyses: October 1986 to September 1963 to September 1965 to September 1966 to September 1965 to September 19

		Color	12	2	7	1	1	1	;	;	1	ł	;	:	}
		Hd.	7.7	7.8	7.6	8.1	7.7	7.9	7.9	7.6	7.1	7.1	7.2	6.7	7.3
	Specific conduct-	(micro- mhos at 25°C)	784	746	792	749	160	266	605	665	710	749	762	859	739
	Hardness as CaCO,	Non- carbon- ate		128								135			126
		Calcium, magne - sium	339	332	346	334	316	250				324			325
r 1963	Dissolved		498	471	909	470	474	345	380	408	438	460	474	552	463
tembe	N.	trate (NO <sub>3</sub> )	12	18	18	18	17	9.7	12	12	12	10	9.3	12	13
to Sep	Fluo-	ride (F)	0.5	ď.	ç.	4.	۳.	.2	2.	4.	9.	ç,	9.	9.	0.5
Chemical analyses, in parts per million, water year October 1962 to September 1963	Oblomido		42	40	44	42	20	40	30	27	36	45	47	63	42
year Oct	036_6	(30,	145	124	135	120	113	79	80	93	107	126	138	147	120
, water	Bicar-	bonate (HCO <sub>3</sub> )	238	249	247	242	234	204	246	260	250	230	228	254	243
illion	Po.	Sium (K)	4.4	3.9	3.7	!	1	!	1	i	1	1	l	1	1
rts per m	1	(Na)	36	58	34	1	1	;	١	1	ļ	1	!	ļ	!
, in pa	Mag-	sium (Mg)	35	31	32	1	1	1	1	;	;	ŀ	;	1	!
nalyses	Cal-	cium (Ca)	78	82	98	!	1	1	1	ļ	!	1	1	1	ŀ
nical a		(Fe)	1	a0.00	a,01	-	;	1	1	!	1	1	1	1	ł
Cheı	2011.00	(SiO <sub>2</sub> )	7.3	7.5	5.7	!	1	1	1	ì	1	1	ŀ	1	ł
	Mean	discharge (cfs)													
		Date of collection	Oct, 1-31, 1962	Nov. 1-30	Dec. 1-31	Jan. 1-22, 1963	Feb. 3-28	Mar. 1-4, 28-31	Apr. 1-30	May 1-31	June 1-30	July 1-31	Aug. 1-31	Sept. 1-30	Time-weighted average b

a In solution when analyzed, b Represents 91 percent of days.

Chemical analyses, in parts per million, water year October 1962 to September 1963.—Continued (Analyses pased on maximum and minimum monthly specific conductance, and maximum monthly turbidity)

	(Ana.	lyses	pased o	n maxin	num and	minimum m	onthly	specifi	ic conduct	(Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidity)	max1m	un mon	thly turb	idity)				
	Mean	S. Hos	i	Cal-	Mag.	ali po	Po-	Bicar-	oulfate	Oblorida	Fluo-	-iN	Dissolved	Hardness as CaCO,		Specific conduct-		Ā
Date of collection	discharge (cfs)	(SiO <sub>2</sub> )	(Fe)	cium (Ca)	sium (Mg)	(Na)		bonate (HCO <sub>3</sub> )	(*Os)	(C1)	ride (F)	trate (NO <sub>3</sub> )	(residue Calcium, Non- at 180°C) magne-carbon- sium ate	Calcium, magne - sium	Non- carbon- ate	(micro- mhos at 25°C)	푎	bid- ity
Jan. 9, 1963 (max1- mum conductance)								240	158	46	9.	20	542	371	174	849	7.6	:
conductance)								206	06	30	4.	14	386	270	101	624	7.6	}
turbidity)								1	1	ŀ	1	1	I	1	1	1	1	1500
Feb. 6 (maximum conductance)								242	100	130	8.	16	602	316	1117	266	0.8	1
reb. 11 (minimum conductance)								240	78	34	2.	12	402	290	93	632	8.2	1
reb. 13 (maximum turbidity)								}	1	1	1	1	1	1	1	1	1	10
Apr. 13 (maximum conductance)								a264	86	32	8	11	425	328	103	989	4.8	1
Apr. 22 (minimum conductance)								b165	54	50	25.	9.5	261	200	28	430	8.4	1
May 28 (maximum conductance)								276	111	34	9.	12	453	342	116	742	7.6	:
may I (minimum conductance)								212	62	22	т.	13	332	264	06	550	8.1	1
June 27 (maximum conductance)								246	134	48	φ.	10	468	345	143	782	7.4	1
June 9 (minimum conductance)	~~~							204	74	29	9.	12	324	256	88	563	7.0	ł
July 2 (maximum conductance)								258	140	47	4.	10	504	350	138	798	7.3	1
conductance)								198	106	40	4.	9.4	396	279	117	649	7.5	1
Aug. 9 (maximum conductance)								215	174	55	۲.	7.7	512	345	169	805	7.1	ł
Aug. 22 (minimum conductance)								229	113	44	9.	11	440	302	114	208	7.5	1
Sept. 30 (maximum conductance)								228	186	75	0.5	17	621	366	179	943	7.4	!
Sept. 1 (minimum conductance)								236	138	52	ς.	12	509	320	126	784	6.7	1
a Includes 10 ppm carbonate (CO.)	arbonate (C	(°0																

a Includes 10 ppm carbonate  $(CO_3)$ . b Includes 8 ppm carbonate  $(CO_3)$ .

GREAT MIAMI RIVER BASIN--Continued

3-2746, GREAT MIAMI RIVER AT ELIZABETHTOWN, OHIO--Continued

İ	÷	e e				
	Aver-	age	66 52 41	131	9 6 8	82 81 74
ĺ		3	38	119	121	83
İ		30	57 50 38	57	8 2 2 8	86
		39	58 50 40	1 1 9	64 72 85	82
-		28	56 49 38	5.55	65 73 82	85 79
1		27	51 48 37	38	61 70 84	86 78 69
		56	52 48 40	191	59 72 84	77
63		25	54 48 40	131	56 71 83	34 76
13		24	58 48 40	141	53 69 81	84 80 70
aper		23	49	38	5. 6.8 8.0	82 80 71
water, water year October 1962 to September 1963		22	65 50 42	35	57 66 80	83
တ္တ		21	67 50 43	401	67 70 76	83
2		20	68 50 43	0 4 1	65 71 76	73
196		19	68 52 44	1 4 1	67 73 80	85 82 73 73 77 78
ber		8	69 54 43	649	67 70 80	85 78 76
15		17	72 56 40	38	67 68 80	86 77 77
ar (	Day	16	76 55 36	34	57 68 76	77
ye	_	15	76 51 34	36	68	82 79 74
ate		14	7.5 5.2 3.3	38	60 67 81	78
		13	33	001	59 61 79	78 81 74
ate		12	72 53 34	45	59 63 78	83
2		Ξ	72 53 34	39	59 68 82	84
£		10	72 54 38	39	58 72 85	78 85 79
Temperature (°F) of		6	69 40 40	38	59 74 84	85
tur		8	71 54 43	3.9	8 6 8	82 86
pera		7	72 54 44	42	59 69 82	79 84 76
Tem		9	53	4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	57	77
		5	52	0 6 1	58 75	83 86 75
		4	67 53 50	0 6 4	60 67 74	84 87
		ю	6 4 6 7 6 8	38	64 65 76	84 86 77
		7	66 54 51	39	63	84 86 77
		-	53	8 10	59	83
	Month	WOW!	October November December	January February March	April May	JulyAugust

### 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 Greek, and 3.5 miles west of Warsaw, Gallatin County.

October 1959 to September 1963, Water temperatures: October 1959 to September 1963, RECORDS AVAILABLE. -- Chemical analyses:

Chemical analyses, in parts per million, water year October 1962 to September 1963

		ben- zene sulfo- nate (ABS)	1	ŀ	1	ł	1	1	1	ŀ	ŀ	1	!	!
	1.0													
		Col- or	L											
		<u>н</u>		810 7.9	673 7.0	1	752 7.3	8.3	-	336 7.6	242 7.4	-1	346 7.5	263 7.5
ance)	Specific conduct-	ance (micro- mhos at 25°C)	742			483		238	292			300		
onduct	Hardness as CaCO3	Non- car- bon- ate	176	199	154	118	182	20	65	73	52	70	78	28
ific c		Cal- cium, mag- nesium	220	243	203	152	222	18	86	114	83	104	114	88
er 1963 ly spec		solids (residue at 180°C)	441	484	399	288	460	146	174	202	143	179	198	150
ptem	-soud	us as PO4	-	-	1	1	1	!	1	1	1	1	!	-
Imum	Z	trate us (NO <sub>3</sub> ) as PO <sub>4</sub>	6.8	7.8	10	5.8	8.6	3.2	5.8	6,3	4.1	5.3	5.8	4.6
nd min	F	ride trate (F) (NO <sub>3</sub> )	9.0	9.	.5	2.	٠.	٦.	8.	ĸ.	8.	8.	.2	.2
CHEMICAL ANALYSES, IN PARTS PER MILLION, WATER YEAR OCTOBER 1962 TO SEPTEMBER 1963 HES AND ANALYSES DASSED ON MAXIMUM WEEKLY, MAXIMUM MONTHLY, AND MINIMUM MONTHLY SPECIFIC CONDUCTANCE)	:	Chloride ride tr (Cl) (F) (F)	84	105	73	41	83	17	18	28	14	20	26	50
ximum m	:	Sulfate (SO <sub>4</sub> )	170	174	150	118	186	47	63	70	46	89	7.7	28
оп, wa ly, ша	Bi-	ate (HCO <sub>3</sub> )	54	54	09	42	49	37	40	20	37	42	44	36
week	Lith	E.j.												
ximum	Po-	tas- sium (K)												
Composite analyses and analyses, in part		Sodium (Na)												
yses,	~	sium (Mg)	!	!		!	1		¦	1	;		1	!
analys	j		1	!	1	-	1	1	 	1	1	-	1	!
s and		ga- nese (Mn)	_								_,			
11yse		(Fe)	l											
e ans	Alu-	(Alm min												
mposit		Silica mi- (SiO <sub>2</sub> ) mum												_
(Co	Mean	discharge (cfs)												
	Date	collection	Oct. 1-31, 1962.	Maximum monthly	Minimum monthly	Nov. 1-30	Maximum monthly	Minimum monthly	Dec. 1-31	Maximum monthly	Minimum monthly	Jan. 1-31, 1963.	Maximum monthly	Minimum monthly

OHIO RIVER MAIN STEM--Continued

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

Alkyl ben-zene sulfo-nate (ABS) Organics ŀ 1 1 1 1 1 1 ļ 1 1 ٥. Col-nols or as Calls 417 7.4 7.6 6.7 6.0 1 7.3 7.0 7.5 7.2 7.0 Hd ŀ ļ ance (micromhos at 25°C) Specific conduct-692 438 272 126 316 346 258 102 144 392 235 332 188 333 386 per million, water year October 1962 to September 1963--Continued on maximum weekly, maximum monthly, and minimum monthly specific conductance) Non-car-bon-8 58 52 69 42 98 58 87 86 79 86 107 57 1 1 Hardness as CaCO, mag-nesium ctum, 108 115 92 82 115 67 127 103 98 149 164 143 138 148 86 ŀ 1 į Phos. Dissolved phor. solids us (residue as at 180°C) 210 245 1 ī 191 166 134 191 107 207 265 55 233 257 227 244 153 1 ŀ 1 ì ł i ŀ 1 ł i ł ł ł ŀ 1 22 21 Ni-trate (NO<sub>3</sub>) 5.8 5.8 4.2 2.9 4.2 4.6 4.0 4.6 7.5 4.2 4.0 3.7 4.1 4.5 Fluo-ride t 0.2 7 2 0 ۲. ٥. n 4. 3 n e. 7 2 0 Į į ţ Chloride (C1) 18 13 26 14 26 20 14 14 32 31 56 56 34 16 1 1 Sulfate (SO<sub>4</sub>) 28 113 79 52 89 45 73 155 57 88 97 88 104 81 58 96 102 Bi-car-bon-ate (HCO<sub>3</sub>) 42 41 42 26 30 64 48 92 8 78 52 50 ١ E ith Po-tas-sium (K) Sodium (Na) parts Mag-ne-sium (Mg) ŀ ł ł ł ŀ ŀ ŀ ŀ ł ţ ł 1 ¦ ł ł 1 Chemical analyses, in (Composite analyses and analyses Cal-cium (Ca) ì 1 1 ţ 1 ţ ţ 1 ļ ١ ŀ 1 ١ Man-ga-nese (Mn) Iron (Fe) Silica (SiO<sub>2</sub>) Mean discharge (cfs) Feb. 1-28, 1963 Feb. 19-20,22-23 Maximum monthly Feb. 13, June 12,
Maximum monthly
June 15,
Minimum monthly Apr. 1-30..... Apr. 2, Maximum monthly July 6, Maximum weekly. July 13, Maximum monthly May 21, Mar. 1-31.... monthly June 1-30..... Marimum monthly monthly fay 1-31..... Minimum monthly weekly. weekly. Date of collection Mar. 16, Minimum m Apr. 3, Minimum m Maximum v July 14, Maximum v

-1	1	0.1	۲.	٠.	}	;	٠:	٦.	٠.	1	
						<u>.</u>					
8.2	7.1	8.	0.7	6.7	8.	6.9	9.6	0.7	2.0	6.5	3.5
427 7.8	365 7.1	480 6.8	496 7.0	544	573 6.8	418 6.9	566 6.6	564 7.0	531 7.0	265	459 6.5
98	88	1	1		122	88	1	1	ŀ	127	96
155	135	1	1	1	180	148	1	!	;	189	151
253	218	ł	1	1	347	243	1	1	ţ	356	276
<u> </u>	1	0.26	. 22	.12	1	1	.22	.27	.19	1	1
5.0	4.8	ł	1	1	7.2	5.2	1	1	1	5.9	7.2
1	1	1	1	1	1	1	I	1	1	1	
30	50	1	1		62	32	1	1	}	62	37
88	98	100	112	108	116	83	115	117	115	120	96
	64	1	1	ŀ	70	80		1	-	76	89
12	9.6	1	1	1		9.7	1	ŀ	1	12	10
-42	38	!	1	ŀ	54	47	1	ì	1	99	44 10
July 27, 1963. Maximum monthly	July 1, Minimum monthly	Aug. 7, Maximum weekly.	Maximum weekly.	Aug. 22, Maximum weekly.	Aug. 27, Maximum monthly	Aug. 1, Minimum monthly	Sept. 12, Maximum weekly.	Maximum weekly.	Maximum weekly.	Sept. 1, Maximum monthly	Minimum monthly

Temperature (°F) of water, water year October 1962 to September 1963

	÷	υ				
	Aver-	age	67 52 40	8 8 4 8 70 8	57 55 76	91
		31	59 	33	12	83
		30	50	33	62 70 80	82  72
		29	61 49 38	33	61 79	82 82  73 72
		28	61 48 35	33	61 50 79	82
		27	60 49 37	8 8 3 8 5 5	60 58 79	82 82  73 73
		26	62 49 37	35	60 58 79	82 79 75
1963		25	63	8 8 9	5.9	85
19		24	65 49 37	33 35	60 59 79	82  75
mbe		23	67 37	333	60 58 77	81 82  75 75
epte		22	69 49 36	37	57 58 77	80 82 75
1962 to September		21	70 50 37	36	61 68 78	80 80 76
32 t		20	70	38	59 58 77	81 80 77
186		19	70 51 36	0 4 8 4 8 8	289	81 80 76
year October			71 51 36	4 4 7 5 7	59 58 76	81 82 77
Oct		17 18	72 71 52 51 36 36	39 40 36 35 46 47	59 59 67 58 75 76	81 81 83 82 78 77
ar	Day	91	73 52 37	38 45 45	57 67 75	83
r ye		15	53	8 5 6	57 75	80 82 76
water		14	72 53 36	37	57 58 76	80 82 76
Ħ,		13	72 53 36	37	56 68 76	80 82 76
wate		12	71 52 39	35	56 65 76	80 78
Temperature (°F) of water,		=	1 4 0	35	55 44 77	80 48 78
,¥.)		10	70 54 41	30 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	55 66 78	8 8 0 4 0
e e		٥	6424	33	55 66 77	80 48 78
tur		æ	68 55 44	34	55 75	80 84 78
per		7	4 5 5 5	6 6 4 0 4 0 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	9 4 4 7 8
Теп		9	472	8 4 8	54 74	80 76
		5	53	38	53 73	80 80 76
		4	56	37	53 61 73	86 78
Ì		3	507	37	53	82 83 78
		2	67 52 48	37 33	51 61 73	80 83 77
		-	68 57 49	37 35	50 61 73	80 82 78
	Mooch		October November December	January February March	April May	July August September

### KENTUCKY RIVER BASIN

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

LOCATION.--At gaging station at Woodland Park bridge at eastern limits of Hazard, Perry County, 150 feet upstream from city waterworks dam, and 4.0 miles upstream from Locate Creak.

Strice Arian Arou Locate aniles.

BRICORDS ARIALMELE.--Chemical malyses (revised): November 1949 to August 1950, August 1957 to September 1959 (periodic) October 1962 to September 1963.

Water temperatures: October 1949 to September 1963.

RATEREES 1962-63.--Specific conductance: Maximum daily, 1,20 micrombos Dec. 19, 20; minimum daily, 1155 micrombos Jan. 14.

Water temperatures: Maximum, 89°F July 18; minimum, freezing point on many days during winter months.

EXTREMENS, 1949-63.--Maximum, 89°F Aug. 1, 1957; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1962 to September 1963

		Color bid-	1	15	20	35	\ 	28	45	12800		15	3	95
		S Hd.	-	7.4	7.0		7.2	8.9	7.0	1	8.8	9.9	7.2	-
	Specific conduct-		585	662	494	-	737	1440	177	1	648	1720	266 7	1
bld1ty)			Т	141	96	1	!	280	48		1	1010	72	1
hly tur	Hardness as CaCO,	Calcium, magne-c sium	1	218	148	1	;	726	63	-	1	1090	86	ì
:1mum mont	Dissolved	~ a	389	470	320	1	292	1360	132	;	208	1800	160	1
nd max	Ni-	trate (NO <sub>3</sub> )												
ance a	Fluo-	ride (F)												
(Composite analyses and analyses based on maximum and minimum monthly conductance and maximum monthly turbidity)	Chloride	(CI)	1	10	11	1	1	18	5.0	1	1	11	5.0	1
mum month	Sulfate	( <b>*</b> 0s)	1	238	167	1	ŀ	646	29	ŀ	1	266	95	1
nd mini	Bicar-	bonate (HCO <sub>3</sub> )	1	94	64	}	1	178	18	1	l	95	32	1
1 mum a	Po-	Sium (K)												
ed on max	Sodium	(Na)												
ses bas	Mag-	sium (Mg)												
1 analy	Cal-	cium (Ca)												
ses an	Tron	(Fe)	1	0.04	.11	1	1	.35	80.	1	1	.17	.26	1
e analy	24118	(SiO <sub>2</sub> )	1	32	4.6	1	}	7.8	7.8	1		7.8	7.3	!
(Composit.	Mean	discharge (cfs)	34.0	33	59	35	458	140	3320	39	212	316	165	396
		Date of collection	Oct. 1-31, 1962	Maximum conductance	Minimum conductance	Maximum turbidity	Nov. 1-30 a	Maximum conductance	Minimum conductance	Maximum turbidity	Dec. 1-3, 6-8, 14-16 19-20, 30	Maximum conductance	Minimum conductance	Maximum turbidity

1	ŀ	ł	200	ł	1	1	200	!	1	!	450	1	;	ł	06	;	1	ŀ	40
1	6	7	;	1	2	4	1	ŀ	12	15	1	0	10	s.	1	1	ĸ	ເວ	1
1	7.2	7.0		- 1	8.9	8.9	-	T	7.2	6.8	l	-	7.2	6.9	ŀ	7.2	6.9	8.9	1
304	518	145	-	321	490	146	1	406	973	164	1	462	512	425	1	395	541	247	T
1	184	33	-	1	177	36	-	-	461	42	1	1	114	97	1	1	100	56	
T	226	47		i	210	48	1	1	514	52	1	1	181	156	1	1	180	92	
202	356	120	1	209	338	96	1	270	812	95	!	279	288	258	-	228	330	148	-
!	4.0	3.0	-	!	0.9	3.5	1	i i	12	3.5	1	ŀ	0.9	5.0	1	1	0.9	3.0	-
-	197	42	1	i i	190	43	ı	ţ	478	48	1	;	166	133	1	1	168	70	-
-	51	17	1	à m	40	14	1	1	64	12	1	1	882	72	1		86	44	1
1	90.	91.	1	1	10.	.02	1	1	.19	.02	1	!	.02	8.	1	1	00.	00.	1
1	5.9	7.2	1	i	3.7	9.9	}	1	6.9	6.0	1	1	3.2	5.1	1	1	8.	8.6	1
384	360	580	460	1029	441	2150	2150	4512	1650	1210	33900	161	110	238	238	257	100	288	178
Jan. 1-22, 1963	Maximum conductance	Minimum conductance	Maximum turbidity	Feb. 1-28	Maximum conductance	Minimum conductance	Maximum turbidity.	Mar. 1-28	Maximum conductance	Minimum conductance	Maximum turbidity	Apr. 8-30	Maximum conductance	Minimum conductance	Maximum turbidity	May 1-31	Maximum conductance	May 22, Minimum conductance	Maximum turbidity

maximum urbuilty:

1 A composite value of 0.8 ppm alkyl benzene sulfonate (ABS) was found Nov. 13-27.

A daily value of 1.4 ppm alkyl benzene sulfonate (ABS) was found on Nov. 27.

KENTUCKY RIVER BASIN--Continued

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

Silica Iron clum net. (Na) (KS)  (Sa), (Fe) (Ca) (Mg) (Mg) (KS)	Silica Iron Cal. Mag. Sodium tass both (Ka) (Ka) (Ka) (Ka) (Ka) (Ka) (Ka) (Ka)	Iron   Cal	Mag. Po. Po. Po. Po. Po. Po. Po. Po. Po. Po	Mag. Bodium tas. bos Bis mes (Mag) (K) (K) (K)	Sodium tas- bo (K) (K) (K)	Po-Bi tas-bo sium (R) (K)	ri	Bicar- bonate (HCO <sub>3</sub> )	Sulfate (50,)	Chloride (C1) 8.0	Fluo-	Ni- trate (NO <sub>3</sub> )	1963Con tinued Dissolved as CaCO, Solida (Sacidae Calcium, Non- at 180°C) magne-carbon- 305 608 232 147 214 142 98	Hardness as CaCO <sub>3</sub> as CaCo <sub>4</sub> Non magne-carbo sium at the carbo s		Specific conduct-conduct-mhos at 25°C) 489 652	PH 7.4	Color	Tur- bid- ity
July 1-31	85,3 130 32 166	5.9	1 % %					1 24 0 1	432	6.0		* .	390	373	373	857 439	6.8	10 10	1 1 1 8
	85.1 110 80 120	7.5	1 8 8 1		5			1 6 1	364	0 0 1			318 546 336	314	312	508 735 364	4 0	0 0	340
	30.7 19 22 154	7.2	1 % % 1					1 8 8 1	308	13 7.5			470 348	236	213	612 716 524	6.6	10 10	1   1 01

c Sample for July 30 contained 0.7 ppm acidity (potential free acidity at pH 7.0).

KENTUCKY RIVER BASIN

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

Temperature (°F) of water, water year October 1962 to September 1963

Month																																
Month															Ω	Day																A
	-	2	е	4	2	9	7	8	6	10	=	12 1	13 1	14	15 1	16 1	17 1	18	61	20	21	22	23	24	25	26	27	28	29	30	31	/ verage
October a.m		99		_							-			-										53		-		<u>∞</u>		9	55	09
p.m	02		70 7	72 7	20	74	73 7	72	707	72	74 7	22	80 74		82	80 7	70 7	73 7	74 6	99	18	29	99	22	59.5	53	48	20	28	09	99	89
:		52 5	56 5	56 5	55 4			25			_	50 5		_								_		81				_		9	1	51
p.m.c.	22					26 5	28 6		62 5	52	52 5		50 48		52 5	20 2	55	54 5	57 5	20	50 4	48	47 5	22	54 5	26	545	26	28	09	1	22
a.m								_		_								_				_						32		96	33	42
p.m.d	62	46	48	48	47 4	44	42 4	44	35	32	32 3	32	32 32		32	42	48 5	50 5	50 5	53	54 5	26	56 5	28	46	36	34 3	38	36	38	33	43
a.m				_				_				_			2		<u>.</u>			_				!				ļ		20	1	1
D.m.	32	32	32 3	36 4	40 4	46	46 4	46	42 3	36	33	36	38 34		32	יניי	34	<u>'</u>	3	32	_	:		1	<del> </del>	1	-	1	32	33	-	;
ebruary	_	_					-;					_				_								_		_				_		
	_	e e	- 75	<u>.</u> !	-	1	7 5	<u>.</u> ¦		1 9	222	_	1 8		32	32	322	35	22.5	32	200	22.0	333	200	222	22.5	33	<b>8</b> 1		ļ	!	!
farch	1	_						-	<del>"</del>			1										N N		2				ņ	<u>.</u> ¦	!	<u> </u>	1
a.m	33	32	32 3	32	32 3	32	32 3	33	32 3	32	32	32	34 32		32 3	34 3	34 3	34	34 3	35	43	48	43	38	50	22	48	23	58	54	54	38
p.m										_		_												8							- 62	40
а.ш.		09	9	_		_	55 5						_			_		_				53		51				25		90	-	58
D.M. C.	89	-	9 69	90	52 5	59		63	29 6	9 09	9 09	65	9 09	60 5	58 5	58 6	62 5	58	65 6	89	65	20	69	89	99	99	68 6	- 89	99	26	1	63
_		_		_				_						_		_					_									_		
:	46	48	9 09	9 09	99	65	65 6	65	64 7	20	72 6	65 6	65 6	65 6	98	90	59 6	64	64 6	99	99	92	62 6	99	64 6	63	65 6	89	20	69	20	64
:		_																				69		2						22	92	20
:		71 7	717	707	707	70 7	72 7	72		79 7		72 7	70 7			_			-			72	_	92		_		8	78	78	-	74
:	77								25 8		82			82	83	74 7	78 7	75 7	75 7	92	72 7	74	77	62	8	82	83	84		98		42
a.m				-	_	_		-	_	-	_			-						-	_	8		82		<u>۔</u>		22		84	78	77
p.mAugust	<del>2</del>	85	82	18	82	18	82	18	16 7	73	818	84	81 7	8 62	82	81 8	88	68	8	98	82	98	83	98	82	88	88	87	88	87	98	83
а.в.		-		-						_				_		_				-		82		9	_			82		82	92	11
p.m	88	98	88	88	87 8	88	818	98	82	88	86	87	82	8 8	81	98	84	82	86	82	84	82	84	88	88	83	84	82	8	98	87	82
:								_																				-		96	1	72
D.M.	962	82	86	<u>2</u>	82 79	_	788	18	848	83	86	83	81 80	_	82 7	78 7	79 8	84	87 8	8	84	78	79 7	78	81	18	78	18	94	78	1	81

### KENTUCKY RIVER BASIN--Continued

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

OCATION .--At gaging station at Broadway Street Bridge at Frankfort, Franklin County, 300 feet upstream from Benson Creek, and 0.9 mile upstream from REAINAGE 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 1963.

RECORDS AVAILABLE. --Chemical analyses: October 1949 to Water temperatures: October 1949 to September 1963.

Sediment records: October 1952 to September 1963.

Sediment records: October 1952 to September 1963.

Strikmis, 1962-63,---Dissolved solids: Maximum, 1964 pm Oct 1-31; minimum, 105 ppm June 1-30.

Specific conductance: Maximum daily, 573 micromios Nov 18; minimum daily, 126 micromios Mar. 9.

Water temperatures: Maximum daily, 960 ppm Mar. 13; minimum daily, 6 tons Cott. 28.

Sediment concentrations: Maximum daily, 960 ppm Mar. 13; minimum daily, 6 tons Cott. 28.

Sediment concentrations: Maximum daily, 960 ppm Mar. 13; minimum, 44 ppm Jan. 8, 1962.

Maximum daily, 573 micromios Nov. 18, 1962; minimum, 44 ppm Jan. 8, 1962.

Speciment concentrations: Maximum daily, 573 micromios Nov. 18, 1962; minimum daily, 71 minimum, 19 ppm Jan. 8, 1962.

Sediment concentrations (1952-63): Maximum daily, 24,00 ppm Jan. 31, 1966; minimum daily, 1 ppm on many days during Janeary 1961.

Sediment concentrations (1952-63): Maximum daily, 24,00 ppm Jan. 31, 1966; minimum daily, 1 ppm on many days during 1962 to 1966.

Sediment loads (1952-63): Maximum daily, 24,00 ppm Jan. 31, 1966; minimum daily, 1 ppm on many days during 1982 to 1966.

Columbus, Olio, Flow was regulated by Herrington Lake and by hydroelectric plant at lone or many days during 1982 to 1966.

		Color	æ														
		는 된	7.5	l	7.5	1	1	i	ł	1	1	ļ	ļ	ŀ	1	1	1
	Specific conduct-	ਤ ਦ	282	340	242	207	213	172	180	258	179	215	267	275	209	236	-
	Hardness as CaCO <sub>3</sub>	Non- carbon- ate	26				-		 								
		Calcium, magne - sium	126														
1963	Dissolved		164	1	138	120	124	109	107	151	105	128	148	155	119	132	2030
tember		(NO <sub>3</sub> )															
to Sep	Fluo-	ride (F)		_													
Chemical analyses, in parts per million, water year October 1962 to September 1963	Chlorido	(CI)	14							-							
year Octo	Suffets	(30)	21	_													
water	Bicar-	bonate (HCO <sub>3</sub> )	122	1	92	ł	1	1	1	1	!	1	1	!	-	ŀ	1
llion,	Po-	Sium (K)															
ts per m	Sodium	(Na)															
in par	Mag-	sium (Mg)															
alyses	Cal-	cium (Ca)															
ical an	202	(Fe)	0.00														
Chem	641190	(SiO <sub>2</sub> )	5.2	_													
	Mean	discharge (cfs)				5255		•	3497	4672	5616	2371	1425	612	6304	ŀ	ŀ
		Date of collection	Oct. 1-31, 1962	Nov. 1-30	Dec. 1-31	Jan. 1-31, 1963	Feb. 1-28	Mar. 1-31	Apr. 1-30	May 1-31	June 1-30	July 1-31	Aug. 1-31	Sept. 1-30	Weighted average	Time-weighted average	Tons per day

## KENTUCKY RIVER BASIN -- Continued

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

	į	bid- ity		1	009	1	1	190	}	1	450	!	1	110	1	1	130	1
		Color	16	7	1	25	18	1	15	9	1	25	20	1	2	80	1	2
		Hd.	7.8	7.5	1	8.2	8.2	1	7.7	7.6	1	7.5	7.5	ŀ	7.4	7.4	1	7.8
	Specific conduct-	(micro- mhos at 25°C)	336	238	ł	573	261	1	304	206	ł	235	178	1	241	177	1	219
	Hardness as CaCO <sub>3</sub>		30	20	;	81	36	1	53	34	1	31	22	!	34	24	1	20
ty)	Hard as C	Calcium, magne - sium	150	102	1	163	114	1	120	86	I	28	70	ł	92	71	I	96
Continued y turbidi	Dissolved	n 🙃	195	136	1	349	160	-	184	120	ł	142	114	ì	164	102	ł	136
1963	i,	trate (NO <sub>3</sub> )																
mber	Fluo-	ride (F)																
Chemical analyses, in parts per million, water year October 1962 to September 1963.—Continued (Analyses based on maximum monthly specific conductance, and maximum monthly turbidity)	Chloride	(C1)	14	9.5	1	105	12	ļ	30	0.6	1	22	0.6	1	15	7.5	f	7.0
ctober 19	Sulfate	(*os)	28	18	1	34	30	1	35	23	1	56	24	1	31	23	}	23
year O		bonate (HCO <sub>3</sub> )	146	100	1	100	96	1	83	78	I	65	28	1	74	58	ł	92
water ily sp	9 t	Sturn (K)																
million, imum mont	Selin	(Na)							·									
rts per and mini	Mag-	sium (Mg)										112						
, in pa	Cal-	cium (Ca)																
alyses don m	1	(Fe)	00.00	8.	!	.08	.05	1	.04	.01	1	.20	.12	}	90.	.26	ļ	.03
ical ar es base	91150	(SiO <sub>2</sub> )	6.2	3.9		6.8	7.1	1	6.1	5.9	1	7.0	7.1	}	6.4	5.6	1	6.2
Chemi (Analyse	Mean	discharge (cfs)	432	4380	432	3640	11100	16600	14500	16000	14500	4590	2600	2900	16900	10300	13000	37400
		Date of collection	Oct. 19, 1962 (maxi- mum conductance)	conductance)	turbidity)	Nov. 18 (maximum conductance)	conductance)	turbidity)	Dec. 25 (maximum conductance)	conductance)	turbidity)	Jan. 19, 1963 (maxi- mum conductance)	conductance)	turbidity)	Feb. 6 (maximum conductance)	conductance)	turbidity)	Mar. 5 (maximum conductance)

KENTUCKY RIVER BASIN--Continued

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

		Tur- bid- ity		1000	ł	1	130	ł	ł	006	ŀ	;	200	!	ł	80	1	1	55
		Color	16	1	8	4	1	n	6	1	9	35	ŀ	8	22	1	10	2	1
		Hd.	7.3	1	7.1	8.9	!	7.4	6.6		7.0	7.0	ŀ	7.4	7.5	1	7.2	7.3	T
	Specific conduct-	(micro- mhos at 25°C)	126	1	192	168	1	434	166	1	203	131	I	262	187	1	293	232	1
			14	1	37	26	1	64	20	İ	24	14	T	28	18	1	40	14	T
eq	Hardness as CaCO,	Calcium, Non- magne-carbon- sium ate	49	1	78	64	ł	126	29	1	46	52	1	86	88	1	122	80	1
Continu	Dissolved	ં ત	82	1	111	96	1	242	96	ł	117	89	1	143	113	1	159	120	1
r 1963.	Ni-	trate (NO <sub>3</sub> )																	
tembe	Fluo-	ride (F)																	
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued	ting 10	(C1)	5.0	1	7.0	11	1	67	12	1	16	8.0	ł	31	0.6	1	17	14	1
October 1	- Contract	(30°)	19	ŀ	32	27	1	52	24	ŀ	18	13	1	21	17	1	30	26	1
er year	Bicar-	bonate (HCO <sub>3</sub> )	42	1	20	46	1	16	-84	1	89	46	ŀ	20	78	1	100	88	1
ı, wate	Po-	stum (K)																	
r millior	i po	(Na)																	
parts pe	Mag-	sium (Mg)																	
s, in	Cal-	cium (Ca)																	
analyse	į	(Fe)	91.	ŀ	8.	8.	1	8.	.03	1	10.	80.	1	%	90.	1	.01	.02	1
mical	071170	(SiO <sub>2</sub> )	5.8	1	7.8	8.7	ł	4.9	7.0	I	4.8	6.2	1	7.5	7.8	ŀ	6.9	6.9	-
Che	Mean	discharge (cfs)	37900	.16600	5530	4340	6890	2700	13000	19600	12900	5360	14300	1340	2040	804	1020	3280	3280
		Date of collection	Mar. 9 (minimum conductance)	turbidity)	Apr. 9 (maximum conductance)	onductance)	Apr. 3 (maximum turbidity)	May 24 (maximum conductance)	conductance)	May 31 (maximum turbidity)	June 10 (maximum conductance)	conductance)	June 23 (maximum turbidity)	July 6 (maximum conductance)	conductance)	turbidity)	Aug. 17 (maximum conductance)	Aug. 2 (minimum conductance)	Aug. 2 (max1mum turbidity)

58 667 667 73

	1	1		25	
	2	2		1	
-	:	6.9		ţ	
000	007	261		1	
00		34		1	
-		106		1	
-	201	150		-	
4	3	17		1	
26	;	58		1	
2	1	88		!	
60		.02		1	
œ	;	2.6		1	
015	9	299		823	
Sept. 7, 1963 (maximum conductance)	Sept. 18 (minimum	conductance)	Sept. 9 (maximum	turbidity)	

to September 1963		27 28 29 30 31	57 <u>57</u> 55 55 <del>57</del> 56 55	944	04 04 04 0 40 0 40 0 40	35 35	11	51 52 50 51	62	68 67	76	78 80 76 78	77 78 76 76	69
		28 29	7.17				11	- o	2.2	စေသ	0.4	00 00	r 9	6, 80
1		28		4 6	2 80			in in	9	00	∞ r-	~ ~	-	99
1			Ŀά		40	3 4	1 1	50	62	999	78	76	77	70
mber 1963			an o	46	38	35	37	6 4 8	62	68	77	77	78	70
mber 1963			57	7 4 4 0	3.6	36	37	4 4 0 0	62	68	77	78	79	71
mber 1963		26	52	4 4	36	36	38	6 4 8	63	8 9	76	7.8	79	72
mber 1963		25	60	4 4 7 4 7	3.9	1 1	37	4 4 8 30	62	6 8 8 9	75	77	78	72
mber 1		24	61	4 8	104	1.1	37	0 X	62	68	75	77	78	72
월		23	63	4 4 8 8	4 1 0 4	3.4	39	4 4 0 9	29	69	73	77	78	73
9 -		22	63	4 8 8 4	39	36	3.9	50 6	64	69	74	7.7	76	73
Sept		12	4.0	2, 20	39	3.8	39	200	69	59	7 4	76	74	7.6
to		20	63	6 4 6	38	38	38	50	60	69	76	7.3	73	76
962		61	63	50	3.4	80 80	38	2.0	69	68	76	77	73	7.6
117		<u>@</u>	6.5	0.0	3.7	3.8	38	64	98	67	74	76	74 73	77
tobe		17	67	50	80 80	3.7	38	6 8	5.4	69	73	7.5	75	76
(°F) of water, water year October 1962 to Sept	Day	91	66	50	1.1	38	0 80	8 8	58	68	73	76	76	78
year	"	15	65	50	11	0.00	38	4 4	5.7	69	73	75	77	75
er		47	6.6	51	38	38	3.8	4 4	5.7	99	73	71	77	74
wat a		53	65	52	3.9	410	3.78	4 4 6 0	57	6.5	73	71	77	77
er,		12	63	52	3.9	30	37	4 4 0 0	57	67	72	7.1	77	78
wat		=	4.60	505	4 7 7 1 4 7	3.9	7 5	4 4 6 6	57	6.9	72	76	76	78
Jo t		01	63	52	6 7	38	3.7	4 4 0 12	57	69	72	78	75	90
Temperature (°F)		6	6.3	52	44	a . r	37	4 4 6 6	0 v	68	72	78	76	7.8
re C		œ	6.5	5.2	4 4	8 8	37	4 t	5.6	6.5	0 2 9	7.7	75	74
ra tu		7	63	553	6.4	ec ec	3.5	4 4 5	55	65	69	79	78	77
mpe		9	4.6	5.2	4 6 6 6	3.8	35	4 4 2	5.5	64	69	79	76	79
Te		2	4,9	53	7 9 7	3.8	35	40,4	5.0	63	67	81	76	77
		4	63	53	46	3.8	3.5	0 %	5 50	63	67	82	76	78
		က	65	4.6	46	8.7	3.5	3.0	3 4	62 6	67	78	76	78
1		2	67	5.5	94	3.9	35	8 6	52	61	67	81	73	78
		-	65	5.5	9 4 4	3.6	35.5	38	5.2	62 6	67	9 2 2	 8 8 8	79
-				- : :	::	-	11	- ; ;	11	11	::	11	::	: :
		Montn	October Maximum Minimum	c -	December Maximum Minimum	88	ry mum	March Maximum Minimum	I xımum nimum	rimum	June Maximum Minimum	mum		September Maximum Minimum

### QUALITY OF SURFACE WATERS, 1963

### KENTUCKY RIVER BASIN -- Continued

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

E Estimated.

S Computed by subdividing day.

195

### KENTUCKY RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963---Continued

1		APRIL			MAY			JUNE	
ĺ	-	Suspend	ed sediment		Suspend	led sediment	1	Suspen	ded sedimen
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	7660	94	1940	1780	11	53	11100	345	5 11000
2	7070	77	1470	2270	10	61 54	5920 4090	192	3070 1950
3	6890 6800	72 72	1340 1320	2010 1880	10	46	4090 3400	177 168	1950
5	6540	65	1150	1880	8	41	3320	160	1430
- 1	6400	57	985		1 .	33	5360	148	2140
7	6140	50	829	1540 1260	8 8	27	10900	134	3940
8	5750	42	652	1310	9	32	12000	126	4080
9	5530	38	567	1510	10	41	15800	197	8400
0	5320	41	589	1240	10	33	12900	237	8250
1	5190	40	560	1180	12	38	8350	126	2840
2	4340	35	410	1020	13	36	5360	78	1130
3	3320	28	251	1060	13	37	3920	69	730
5	2380 1600	21 20	135 86	1080 1040	13 13	38 36	3240 2850	66	577 508
- 1									
16	1600	20	86	1210	13	42	2240	66	399
17	1540	21	87	3720	13	130 244	1970	66	351
9	1480 1370	21 21	84 78	6450 10400	14 45	1260	1720 1430	65 65	302 251
0	1160	23	72	13400	76	2750	1370	65	240
21	1480	31	124	9600	48	1240	5580	73	1100
22	1130	19	58	6270	39	660	11800	132	S 4640
3 !	1630	15	66	3800	26	267	14300	367	14200
24	2300	15	93	2700	21	153	7300	104	5 2170
25 • • 1	1970	13	69	2240	20	121	3880	66	691
26	1480	13	52	1720	20	93	2480	5.8	388
7	2010	13	70	1510	20	82	1660	52	233
28	1540 1370	12 12	50 44	1750 13000	22 153	104 5 6740	1370	43 38	159 144
30	1910	12	62	25400	460	31500	1460	36	144
31				19600	829	43900		1	
otal	104900		13379	144830		89892	168470		76995
		JULY			AUGUST			SEPTEMBE	R
1	1430	36	139	3280	40	354	445	13	16
2	1290	36	125	3280	37	328	690	. 13	24
3	861	36	84	2920	32	252	419	13	15
5	672 940	36 36	65 91	2700 2010	! 23	168 114	654 546	13 13	23 19
					:				-
6,	1340	37	134	1720	21	98	370	12	12
7 8	1510 3320	37 37	151 332	1690 940	21 21	96 53	510 804	11 10	15 22
9	3720	36	362	1820	21	103	823	10	22
10.0	5360	36	521	2200	20	119	564	10	15
1	4050	36	394	1780	20	96	484	10	13
2	2770	36	269	1480	21	84	636	10	17
3	2200 2070	47 55	279 307	1820 1720	20	98 98	654 471	10	18 14
5	1570	71	301	960	21	54	618	12	20
1								9	12
7	1460 1400	65	256 219	1370 1020	22	81 63	484 920	9	22
8	874	56	132	1160	24	75	599	10	16
9	804	55	119	823	33	73	747	10	20
20	2080		E 480	1060	45	129	474	10	13
21	2040	59	325	960	44	114	636	10	17
22	3320	57	511	546	34	50	542	9	13
23	4380 3760	56 56	662 568	823 842	42 42	93 95	379 732	9	9 18
25	2850	56	431	454	17	21	404	10	11
			2.2		1 ,	23	409	10	11
27	2480 2240	54 46	362 278	654 747	13	23 28	747	10	20
28	1600	41	177	600	14	23	766	10	21
29	1970	41	218	1040	13	36	1160	7	22
30	4890	41	541	960	14	36	672	6	11
31	4250	40	459	785	13	28		1	-
	73501		9292	44164		3083	18359		501
otal									
otal	discharge	for year	(cfs-days)		<b></b>				2300878

KENTUCKY RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: B. bottom whitherwal the C., chemically dispersation; N, in mative water; (Methods of analysis: B. bottom withdrawal the C., chemically dispersation; N, in mative water; P. pipet; S, sieve; V, visual accumulation the; W, in distilled water)

	Mothod	jo .	analysis	SBWC	SBWC	SBWC
			2,000			
			1,000			
		eters	0. 500			
		millim	0.250			
	iment	ated, in	0,125	100	001	ŀ
	Suspended sediment	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	86	66	100
	Suspen	han siz	0.031	96	97	66
		finer	0.016	98	85	86
,		Percen	0.008	72	77	94
•			0.004	58	29	82
			0.002	48	47	72
r, piper, s, stere, r, roma accumination case, m attended "marry	Sodimont	discharge	(tons per day)			
, ototo (	Sediment	concen- tration	(mdd)	947	931	483
t, paper,		Discharge (cfs)		50400	19200	14800
	Water	ber-	(°F)			
	Gomin	ling	point			
		Time ling per-		1230	1330	080
		Date of collection		Mar. 13, 1963	May 31	June 23

### KENTUCKY RIVER BASIN -- Continued

3-2915. EAGLE CREEK AT GLENCOE, KY

LOCATION. --At gaging station, 600 feet upstream from bridge on State Highway 16, 0.5 mile south of Glencoe, Gallatin County,
5.7 miles downstream from Pountie Greek, and 21 miles upstream from mouth.
BENIAMOR MESS. --437 square miles.
RECORDS AVAILABLE. --Water temperatures: October 1949 to September 1963.
Sediment records: November 1961 to September 1963.
EXTREMES, 1962-63. --Water temperatures: Maximum, 84°F June 9, July 2, Aug. 4; minimum, freezing point on many days during December
EXTREMES, 1962-63. --Water temperatures: Maximum, 84°F June 9, July 2, Aug. 4; minimum, freezing point on many days during December

Sediment concentrations: Maximum daily, 2,400 ppm Mar. 17; minimum daily, 14 ppm Oct. 1, June 2, July 1, 19. Sediment loads: Maximum daily, 103,000 tons Mar. 5; minimum daily, less than 0.5 ton on many days during October, July, and to February.

EXTREMES, 1949-63.—Water temperatures: Maximum, 93°F Sept. 1, 2, 1953; minimum freezing point on many days during winter months. Settlement concentrations (1961-63): Maximum daily, a pine maily 4 pine Apr. 27, 1963; minimum daily, 4 pine Apr. 27, 1963; minimum daily, 4 pine Settlement loads (1961-63): Maximum daily, 103,000 tons Mar. 5, 1963; minimum daily, less than 0.5 ton on many days in 1962 and

REMARKS. -- No temperature record Dec. 19 to Jan. 9, Jan. 18 to Feb. 20, May 17-28.

ature ('F) of water, water year October 1962 to September 1963 (Twice-daily measurements at approximately 0700 and 1900)	Aver-	19 20 21 22 23 24 25 26 27 28 29 30 31 age		65 61 61 53 53 50 43 47 45 55 55 51	43 43 42	42 43 43 43 43 43 43 42 42 41 (1 41 45		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			32 32 32 32 32 32 32 33	32 33 34 33 32 32 32	50 49 42 42 45 48 50 50 52 53 54 55 57 45	51 48 46 45 47 49 51 50 53 53 55 57 57 46	1 1 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	70 69 69 68 66 68 69 67 66 67 68 69 58 62	89 69		73 74 73 72 72 73 75 75 77 77 79 73
water, water year October 1962 measurements at approximately 07	Day	15 16	0.4			64 84	32 32	32 32	3.5	32 32	- 1	1	47 46	47 45		58 58	68 65		73 71
rye		14				6,4		35		_	1	<u>.</u>	9,	48		2.50	99		73
wate		13	- 14	89		6,4		3.5	3.5		- 1	ŀ	ر د	47		5.0	62	_	7.4
er, urem		12	04		0.7	0 1	3.2	32	37		1	1	4.2	4		5.0	- 7		74
wat		=	4	99	64	64	3.2	32	37	38	- !	i	5	45		200	09	61	75
of ly 1		10	4		7	4,0	3.2	35	3.5		!	1	4	4		u S	75		4
Temperature (°F) of (Twice-daily n		6		63	4.	4,6	32	32	- 1	1	ł	1	4	4		n o	74		7.8
rice		80		62	4	40		35	- 1	1		1	4	43		U (V	7.4		73
ratu		7	7	63	4 0	\$	3.2	32	- 1	1	- 1	1	4.2	4,3		0 0 0	72	7.2	7.0
m be		9	7.0			4.5	32	3.2	1	1	1	ļ	4	4.2		2 9	7.2	_	68
e.		2	7.3	12	4,	9,	34	33		1	ł	1	37	38	Č	7 0	7.2	7.5	70
		4	7.2		7	t,		0,	ł	!	1	1	35	35		9 9	09		7.0
		3	**	7.7	7	£3	4.1	4	- 1		-1	-	3,4	35		9 9	0,9	9	7.0
		2	2			45		9	- {	1	ì	1	33	34		9	09		70 70
		_	· · · · ·	64	5.0	4	0.4	9	- ;	1	- 1	1	33	33		6.2	56	26	7.0
	Month	MORE	October	November	E	December	E	· · · · · · · · · · · · · · · · · · ·	January a.m	p.m.	B. B	p.m	a market	e c	April	D.B.	May a.m	p.mJune	8. E

KENTUCKY RIVER BASIN--Continued

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

	Aver-	age		7.3	46	7.3	7.7	67	7.0
	-4			7.5	83	m	9	1	i
		0 31				77 77 77 77 78 77 76 74 77 76 77 76 75 71 70 71 71 70 70 65 66 68 71 77 70 70 70 72 72 73	74 76 76		
		9		77 76	82 82	2 7	4	20	6
İ		22		- 2		7	7		w.
		7 28		- 4	81 82	-	7	9	4
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30		79 78 76 77 74 76 73 73 73 72 72 73 73 72 74 76 79 79 78 74 74 74 75 76 76 75	80		83 84 83 82 82 82 82 80 81 81 78 75 74 75 75 74 73 70 70 71 73 75 75 75 72		9
Temperature (°F) of water, water year October 1962 to September 1963Continued (Twice-daily measurements at approximately 0700 and 1900)		2		5 7	80 82	2	3	9	9
ntir		5		_	8		7		9
β -		2		7.7	82 76 75 75 77 78	8 7.1	3 7	9	9
(°F) of water, water year October 1962 to September 1963- (Twice-daily measurements at approximately 0700 and 1900)		23		7	_	•	~	4	9
40		22		7 4	5 75	99 9	7.	65	1 20
an		77			7	9	_	- 9	7
epte 0700		20		78	16	7.0	2	67	12
o S		19		75	82	7	2	9	73
32 t		81		79	80	7.1	7,4	68	72
19( 0x1r		17		76	90	7.1	75		72
per	Day	16		7,4	80	7.0	7.5	67	73
Octc at a		15		-!	79	7.1	74	6,9	73
ar		14		72	16	1	75	6,4	69
r ye		13		73	16	75	78	7.1	7.0
sur		12		73	7.8	76	20	72	7.5
r,		=		7.2	77	7.7	Ë	7.3	16
ate 11y		01		7.2	16	16	80	7.2	9,6
Jc a-da		ტ		73	80 78 80 75 75 78 75 76 77 78 76 76 76 80 80 80	77	82	7.1	16
F)		80		73	78	74	82	7.1	15
್ಫಿಕ		7		73	7.5	76	82	68	73
tur		9		76	15	1	82	68	72
era		ഹ		7,	80	77	83	7.1	73
Тепј		4		7.7	7.8	7.8	8	72	73
		က		76	80	7.7	83	7.2	73
		7		7.8	83 84	77	83 83	2	14
		1		79	83	7.7	83	7.2	7.4
	1	Month	fulv	a. m	р.ш.	August	D.B	September September 32 70, 72 72 72 72 72 72 73 72 73 73 73 73 75 75 69 67 68 68 67 66 65 61 60 60 60 69 59 59 59	p.m 74 74 73 73 72 73 75 76 76 76 76 76 76 77 70 69 73 72 72 72 72 72 72 70 65 65 65 65 65 65 65 65 65 65 65 65 65

### KENTUCKY RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963 (Where concentrations are not reported, loads are estimated)

		OCTOBER		J	NOVEMBER			DECEMBER	
		Suspend	ed sediment		Suspende	ed sediment		Suspend	ded sedime
Day	Mean dis- charge	Mean concen-	Tons per	Mean dis- charge	Mean concen-	Tons	Mean dis- charge	Mean concen-	Tons
ĺ	(cfs)	tration (ppm)	day	(cfs)	tration (ppm)	per day	(cfs)	tration (ppm)	per day
1	3 • 2	14	Т	52	26	4	53	71	10
2	5.5	16	T	47	25	3	53	71	10
3	958		1900	40	25	3	52	70	10
4	3670		15000	33	23	2	50	64	9
5	600		320	33	20	2	42	54	6
6	147		20	30	18	1	38	47	5
7	99		8	28	19	1	38	43	4
8	73		6	25	16	1	35	30	3
9	50 31		4	748 6060	428  S	4080 13400	35 29	37 38	3
- 1				il .					3
1	24		2	4640	216 93	3480	25 19	44 50	ž
2	19 17		2	739 258	74	186 52	15	53	
3	14			258	48	28	14	53 57	2
	12		1 1	105	37	10	13		2
+	12	2,	,	104	35	1.7	12		1
7	12 11	31 36	1 1	184 562	79 S	17 202	12 11		1
	12	33	i	1570		500	ii		i
	8 • 2	34	ī	1500		450	11		j
•••	6.7	34	ī	600	46	74	11		;
١	3.6	32	т	350	37	35	14		1
2	2.4	32	Ţ	250	38	26	2600		8000
3	2 • 6	32	т	180	39	19	1020		550
•••	4.0	32	T	130	40	14	543		94
•••	3 • 6	27	т	100	71	19	264		24
	4.9	20	т	81	106	23	147		11
7	3.8	17	Ţ	71	94	18	101	:	7
3	6.7	21 !	Ŧ	64	67	12	81		6
9	366		330	59	60	10	150		11
٠.٠	111	74	22	56	66	10	500		36
1	62	38	- 6				2000		146
otal	6343.2		17634	18815		22682	7987		8965
		JANUARY			FEBRUARY			MARCH	
1	800		60	100	28	8	3560	1 ]	21000
2	350		29	500	26	35	2620	430	3040
3	250		22	1500	27	109	1160	410	1280
	150		13	700	25	47	4600		5 36800
5	120		11	300	27	22	15900	2250	S 103000
5	100		9	150	31	12	9160	820	S 25500
7	85		8	120	31	10	2170		5 809
3	70		7	100	31	8	1070	50	144
9	62	37	6	90	30	7	753	41	834
0	65	36	6	200	31	17	1040	104	292
١	71	32	6	450	29	35	2390	372	5 4080
2	1780	700 A		800	27	58	3500		5 4490
3	647	224 5	441	450	28	34	1340	160	579
• • •	258	326 S		300	30	24	830	113	253
5	143	168	65	151	33	13	543	110	161
5	101	78	21	120	33	11	4610	1060	S 34000
7	79	51	11	93	34	8	13400	2400	A 87000
3	71	37	7	85	36	8	3400		5200
•••	62	32	5	85	37	8	4180		21500
••	54	33	5	89	37	9	6040	1010	5 18800
••	46	33	4	103	38	10	1540	400	1660
2 • •	40	30	3	114	42	13	893	202	487
3	35	32	3	93	43	11	615	134	222
5	33 31	34 31	3 2	89 87	43 30	10	478 406	132 114	170 125
				ls.	1			i	
•••	30	32	2	117	43	14	739		S 258
7	28 27	30 28	2 2	193	61 88	32 32	1610 1090	121	526 309
	26	28	2	135		32	653	94	166
					1 == 1			95	139
9		25	2						
	25 25	25 27	2				543 949	96	246

S Computed by subdividing day.
T Less than 0.5 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 1962 to September 1963--Continued (Where concentrations are not reported, loads are estimated)

+		APRIL	ad andir	1	MAY	dad sadimans		JUNE	dad sading
	Mean	Suspende	ed sediment	Mean	<del></del>	ded sediment	Mean	Suspen	ded sedimen
Day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	1330	94	338	1000		334	85	18	4
2	614	96	159	248	58	39	69	14	3
3	426	96	110	114	60	18	58	16	2
5	281 202	89 61	68 33	87 73	62 35	14 7	54 386	20 1300	A 1400
•••	202	61	25	,,	3,	'	500	1,000	1400
6	159	94	40	65	22	4	1020	1200	A 3300
7••	135 120	92 86	34 28	58 54	24 24	4 3	198 99	155 95	83 25
9	129	86	30	50	24	3	64	56	10
0	129	35	12	46	24	3	50	44	6
1	114	25	8	40	28	3	48	43	6
2	89	28	7	38	20	2	47	36	4
3	79	28	6	436		1100	34	32	. 3
5	69 67	22 36	4 6	1780 530	2000 520	A 9600 744	93 71	54 94	S 15
1							ĺ		
6	62	29	5	175	230	109	50	66	9
7 · ·	62 62	34 28	6 5	2650 3260	440	13000 3870	32 29	44 37	4 3
9	62	26	4	872	210	494	30	34	3
0	60	21	3	2190		13000	30	36	3
1	56	17	2	1360		2400	30	38	3
2	53	22	3	439	120	142	31	44	4
3	48	19	2	230	84	5 2 3 3	23 18	32	2
5	46 44	21	2 2	155 120	79 73	24	23	27	1
- }		1							i
7	41 38	22 26	2	105 97	64	18 12	25 21	23 24	2
8	38	25	2	. 99	37	10	16	21	l i
9	38	29	3	111	37	11	13	26	1
1	1040		550	103 101	27	8	12	18	1
-					+				
otal	5693	JULY	1477	16686	AUGUST	45067	2759	EPTEMBE	4921
		1			т		<b>!</b>		
2	10 11	20	7 1	16 13	45 37	2	27 22	79 56	, 6 3
3	13	24	i	11	29	1	19	63	3
4	10	35	1	10 9.0	30 23	1	23 25	46 57	3 4
5	8.2	35	1	9.0	2.5		, 25	31	
6	10	34	1	11	20	1	38	46	5
7 • •	54 21	69 73	10	12 11	19 35	1	28 19	43 35	3 2
9	16	57	2	11	28	1	15	33	1
0	11	46	1	12	30	1	12	28	1
1	9.4	37	1	15	17	1	9.4	24	1
2	7.0	29	1	24	21	1	7.4	24	Ţ
4	6.4 8.6	30	1	23 436	35	2 230	6.1	39 39	1
5	29	26	2	264		s 71	4.3	33	, 1 1
6	19	20	1	101	105	29	3.4	35	т
7	17	22	1	60	83	13	2 • 2	33	Т
8	12	22	1	40	106	11	1.5	24	T
9	10 272	14 215 S	7 340	34 1560	93 540	8 S 4290	1.0 1.0	23 24	T
							1	!	
1	1620 680	1360 470 S	5950 1000	1220 381	704 285	S 2600 293	.9	39 40	T
3	198	258	138	135	287	105	.6	45	Ť
4	91	123	30	19	241	51	•6	37	Ţ
5 • •	58	107	17	56	185	28	• 4	35	Т
6	36	76	7	40	122	13	• 3		т
7••	26	57	4	29	116	9	• 3	48	Ī
8	29 34	56 58	4 5	105 79	134 124	38 26	•3	42 60	T
۰. ۱	34 25	47	3	53	96	14	•2	42	Ť
9 0		40	ź	46	97	12	12		
9 0 1	19								
۱.۰۰	337 •6		7532	4896		7856	274+1		36

T Less than 0.5 ton.
A Computed from partly estimated-concentration graph.

Method of analysis

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

0.250 0.500 1.000 2.000 Percent finer than size indicated, in millimeters 18811111 0.016 0.031 0.062 0.125 Suspended sediment Particle-size analyses of suspended sections; water year October 1962 to Spriember 1963 (Methods of analysis: B. bottom withdrawal the; C. chemically dispersed; D. decandation; N. in native water; P. pipet; S. sieve; V. vimaal accumulation tube; W. in distilled water) 999 999 1000 1000 97 99 99 99 99 98 885 882 882 72 72 97 0.008 69 70 67 70 94 94 0.002 0.004 58 57 54 54 34 81 80 90 544243 605443 6094 Sediment discharge (tons per day) Sediment concen-tration (ppm) 996 3300 3300 833 2130 2130 1140 Discharge (cfs) 3860 1720 1080 Water tem-per-ature (°F) Samp-ling point Time (24 hour) 2030 1930 1830 1830 0630 0630 0825 Mar. 4 Mar. 4 Mar. 19 May 14 Jay 14 Aug. 23 Mar. 1, 1963..... Date of collection

### SALT RIVER BASIN

3-3015. ROLLING FORK NEAR BOSTON, KY.

LOCATION.--At gaging station at bridge on U.S. Highway 62 and State Highway 61, 0.4 mile downstream from Beech Fork, and 2.3 miles southwest of Boston, Nelson County.

PRINKER AREA.--1.299 square miles.

RECONDS ANAILABLE.-Chemical analyses: October 1965 to September 1952.

RECONDS ANAILABLE.-Chemical analyses: October 1969 to September 1963.

EXTREMES: 1962-63.--Water temperatures: Maximum, 74°F Aug. 28, Sept. 2; minimum, freezing point on many days during December EXTREMES: 1949-63.--Water temperatures: Maximum, 87°F July 4, 1950, June 22, 25, 28, 1954; minimum, freezing point on many REARKS.--No temperature record Apr. 28 to June 23.

Temperature (°F) of water, water year October 1962 to September 1963

						1			IMICG-daily		8	3	measurements	8	# T	Dav		Dav	0000		o de la composição de l	001										Aver
Month	-	2	6	4	2	9	-	~	6	2	=	12	13	4	15	16	17	18	61	20	21	22	23	24	25	26	27	28	29	30	31	age
October a.m	57	53	5 to	9.40	50	540	9 4 9	50	9,0	47	5.2	5.5	51	8.0	51	2 4 9	5.0	50	51	0, 00	61	51	50	9.20	5.5	5.0	4.2	52	2.4	50	49	15.5
November	4 œ	6.7	4.2	4.7		4.2		4.1		7		-1,	0.4	7	-	7			- 7	0 1		0		3			7		0 1		1	
p. ii. c	54	7.4		6	4.7	7 7		4.		7 7		4	4	5		46		7 7		. d		7 7		5 2		. d		1 10	9	4.5	1	1 4
a.mp.m.p.m.	4 7 4 7	7 t t	4 4	41	0 r	0 0	7 8 6	35	34	3.4	32	1 %	3.2	3.2	1 6	32	1 8	32	1 6	32	34	12	32	32	3.5	32	3.2	32	32	32	32	1 80
January	1	1		32	32	3.5	ŀ	32		6			1	1	- 1	1		3.2	32	32	- 1	1	32				-	1	1	1	1	1
P.M.	32	34	3.4	35	33	3.5	3.5	3.4	4	3.5	4	3.2	5	32	32	3.2	3.2	34	ě	3.5	32	3.2		3.2	3.2	32	32	3.2	32	32	32	
a.m.	11	1-1		1 1	32	3.6	3.2	3.3	35	32	3.2	3.2	1 6	32	11	1 2	3.2	35	32	32	32	11	32	32	3.2	1 1	33	32	11	11	-1-1	1-1
March a.m p.m	32	32	3.6	35	36	33	5.5	33	5 8	36	39	37	200	37	37	0 4	4 4 5 10	39	4.2 5.1	41	2 m	4 1 2 2	t 1	2 0 4	4 4 0 0	2 4 7 7	t t	51	5.5	4 4 6 4	5.0	6. 4 9. 5
April a.m p.m	58	51	n, n	50	4 4	56	3 to 50	5 7	5.6	649	4 8 1 1	44	5.0	20	4 W	57	50	5.4	50	52	0.0	53	52	7 T	9 5	4 4 U 00	4 4 0 10	11	1.1	11	11	4 to 60 4
May a.m. D.m.	11	1 !	11	11	11	11	1.1	11	-11	; ;	1.1	1.1	1.1	1.1	Ħ	11	11	11	11	11		11	1.1	1 1	11	11	11	11	11	11	11	11
a.m p.m	11	1.1	11	1.1	11	11	11		11	1.1	11	11	1 1	11	11	1.1	11	1 1	11	11	! !	11	1.1	1 89	6.2	69	53 58	64	65	69	1.1	1 !
July a.m p.m	6.89	69	6.8	99	69	65	6.5	64	4 2 4	5.8	6.5	99	6.5	44	6.5	59	500	99	69	9 6	4 9 8 9	69	69	69	69	99	99	69	68	68	68	66
a.m p.m	70	69	70	70	70	7.1	7.2	70	70	72	7 C	70	7.3	70 72	27	54	70	7.0	71	71	73	70	71	71	71	70	70	70	71	73	68	70
р. ш.	70	70	71	0.7	70	59	68	68	69 70 72 74	7,2	70	71	70 76 71 76	27 27	99	71	0.0	57 07	68	69	0.2	69	63	69	69	59	6.8	69	6.5	4.9 5.6		68 70

### GREEN RIVER BASIN

3-3064.9. GREEN RIVER NEAR GREENSBURG, KY.

LOCATION.--At Sardins Fork bridge on Kentucky Highway 487, 1.4 miles east of Greensburg, Green County, and 2 miles upstream from gaging station. DRAINAGE AREA.--756 square miles at gage.

RECORDS AREA.--756 square miles at gage.

RECORDS ANAILABLE.--Chemical analyses: October 1959 to September 1963.

REMARKS.--SMAILABLE.--Chemical and managenese filtered clear when collected. Records of discharge are given for Green River at Greensburg.

	i i	bid- ity	20	m		S		-	6	1 07	7	20	10	15
		Col- or	17	14	7	10	16	130	er.	m	23	2	4	3
		Hd	7.4	7,2	7.8	7.5	7.1	8.9	7.	6	7.0	7.1	7,1	7,1
	Specific conduct-	ance (micro- mhos at 25°C)	163	203	182	162	122	72	150	168	155	153	172	193
	Hardness as CaCO <sub>3</sub>	Non- carbon- ate	16	1	1	18	1	1	}	}	1	1	1	1
1		Cal- cium, magne- sium	76	1		72	1	1			1	1	1	1
er 1963	Dissolved	solids (residue at 180°C)	66	111	86	91	74	63	84	96	93	94	86	108
eptemb		trate (NO <sub>3</sub> )	2.2				_							
32 to S	î	ride (F)	0,1											j
Chemical analyses, in parts per million, water year October 1962 to September 1963		Chloride (C1)	3.6	6.5	5.0	4.5	3.5	1.0	4	4	3.5	3.0	3.5	4.5
er year 0		Sulfate (SO <sub>4</sub> )	16	13	18	91	12	9.6	1	1 2	14	14	10	12
on, wat	ä	bonate (HCO <sub>3</sub> )	73	16	79	99	47	26	70	2 2	72	72	86	98
. millim	Po-	tas- sium (K)	1.7											
parts per		Sodium (Na)	2,5											
es, in	Мад-	ne- sium (Mg)	4.4	_								_		
analys	3	cium (Ca)	23											
emical	Man-	ga- nese (Mn)				.10		1			1	1	1	1
5		Iron (Fe)	0.18	.21	.16	11.	.18	.45	- 6	1 =	.25	.18	11.	.28
		Silica (SiO <sub>2</sub> )	3.2	3.8	3.4	4.9	5.0	4.7	٥	000	6,2	6,2	4.9	4.6
		Discharge (cfs)						12000	966		310			
		Date of collection	Oct. 9, 1962	Nov. 6	Dec. 4	Jan, 8, 1963	Feb. 12	Mar. 12	9	May 14	June 11	July 16	Aug. 21	Sept. 18

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, PARINGEN AREA. --258 square miles (at mouth).
RECORDS ANILABLE. --Chemical analyses: December 1960 to September 1963.
REMARKS..-NO discharge records available.

			Chemica	tl anal;	yses, in	parts p	er mil	lion, wa	ater year	Chemical analyses, in parts per million, water year October 1962 to September 1963	962 to	Septer	ber 1963			!			
	Mean	21.50		Cal-	Mag-	ani po	Po-	Bicar-		140			Dissolved	Hardness as CaCO,	Hardness as CaCO,	Specific conduct-			
Date of collection	discharge (cfs)	(SiO <sub>2</sub> )	(Fe)	cium (Ca)	sium (Mg)	(Na)	Stum (K)	bonate (HCO <sub>3</sub> )	(30,	(C1)	ride (F)	trate (NO <sub>3</sub> )	# C	Calcium, Non- magne-carbon- sium ate	Non- (a	(micro- mbos at 25°C)	뛵	Color	Tur- bid- ity
Oct. 9, 1962		8.9	!					162	26	48			267			460	8.0	80	6
Nov. 6		5.2	1					200	53	98			382			662	7.7	18	7
Jan. 8, 1963		5.0	a0.09					168	59	34			246	184	46	444	7.9	12	4
Feb. 12		8.9	a.11				_	110	19	16			168			265	7.9	38	75
Mar. 12		1	1					1	1	7.5			115			212	1	1	;
Apr. 9.		1	1					1	;	40			234			447	1	;	;
Мау 14		;	1					1	}	63			286			546	1	1	1
June 11		1	1					!	;	82			322	_	_	613	;	!	1
July 16		1	1					1	;	27			206			376	1	1	1
Sept. 18		1	1					1	1	210			578			1080	1	í	:

a In solution when analyzed.

### GREEN RIVER BASIN--Continued

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

LOCATION.—At gaging station at bridge on U.S. Highway 31W, at Winfordville, Hart County. DRAIMOE AREA.—1,673 square miles, of which bebot 180 square miles is noncontributing. RECORDS AMAILABLE.—Chemical analyses: october 199 to September 1963.
Water temperatures: october 1950 to September 1963.
Sediment records: April 1991 to September 1963.

Expression 1992-63. Dissolved solides: Waxinam, 268 ppm Sept. 1-30; maintawn, 139 ppm Mar. 1-31.

Specific conductance: Maximum delly, 719 micrombos cet. 1; minimum deally, 116 micrombos Mar. 14.

Specific conductance: Maximum delly, 710 micrombos cet. 1; minimum, deally, 150 minimum days during becember to Pebruary.

Sediment concentrations: Maximum daily, 40,100 tooss Mar. 6; minimum daily, 187 ppm Reb. 19-21, 1956.

STREMESS 1906-63): Maximum daily, 40,100 tooss Mar. 6; minimum daily, 50 minimum, 75 ppm Reb. 19-21, 1956.

Barforess (1906-63): Maximum daily, 40,700 minimum, 44 ppm Jan. 75 ppm Reb. 19-21, 1956.

Barforess (1906-63): Maximum daily, 40,700 minimum, 44 ppm Jan. 75 ppm Reb. 19-21, 1956.

Sediment concentrations (1951-63): Maximum daily, 51,80 ppm June 14, 1952 minimum daily, 50 minimum daily, 50 minimum daily, 51,80 ppm June 14, 1952, minimum daily, 51,80 ppm June 14, 1952, minimum daily, 51,80 ppm June 14, 1952, minimum daily, 51,80 ppm June 14, 1952, minimum daily, 50, 1957; minimum, freezing point on many days during winter months from 1957 to 1963, 1960 to 1963, 864 minimum daily, 157,000 tons Mar. 1, 1963, minimum daily, 50, 100 minimum daily, 187,000 tons Mar. 1, 1963, minimum daily, 50, 100 minimum daily, 187,000 tons Mar. 1, 1963, minimum daily, 50, 100 minimum daily, 187,000 tons Mar. 1, 1963, minimum daily, 187,000 tons Mar. 1, 1963, minimum daily, 187,000 tons Mar. 1, 1963, minimum daily, 187,000 tons many days in 1852 to 1967, 1960 to 1963, Minimum daily, 187,000 tons Mar. 1, 1963, minimum daily, 187,000 tons Mar. 1, 1963, minimum daily, 187,000 tons Mar. 1, 1963, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily, 187,000 tons Mar. 23, 25-28, minimum daily daily sampless wall

1	i	0 <b>r</b>	6		,	:	į	1	0	2	5	,	1	:	;		:
		Color	80	1	-6	-	1	-			- -	i -	;	-	-	1	1
		평.	7.	i _	7.9		_		7	7	7.3	-	Ċ	_			
	Specific conduct-	_ a	423	431	438	380	302	240	451	366	281	290	376	550	314	377	
	Hardness as CaCO,	Calcium, Non- magne-carbon- sium ate	33	1	1	1	1	1	36	30	22	1	}	;	!	i	1
	Hard as C		143	1	1	1	1	1	141	126	104	1	1	1	1	1	1
r 1963	Dissolved	_ a	229	239	237	223	166	139	256	204	157	176	207	295	177	211	893
ptembe	Ni-	trate (NO <sub>3</sub> )															
to Se	Fluo-	ride (F)															
Chemical analyses, in parts per million, water year October 1962 to September 1963	Chlorida	(CI)	57	;	1	1	1	1	29	48	31	58	46	84	ŧ	!	1
r year Oc	onle to	(30,	13	[	;	1	1	1	52	17	18	1	1	1	!	ŀ	
n, wate		bonate (HCO <sub>3</sub> )	134	1	124	1	1	1	128	118	100	1	1	1	1	ŀ	1
millio	Po-	Sturn (K)															
arts per	1	(Na)															
s, in p	Мад-	sium (Mg)							8.2								
nalyse	Cal-	cium (Ca)							43	1							
emical s	100	(Fe)	00.0	i	ŀ	;	1	1	18	0	10.	!	1	1	!	ŀ	1
Che	60119	(810,	8.3	1	1	;	1	1	6.4	2.0	7.8	1	ļ	1	1	;	1
	Mean	discharge (cfs)	1115	1373	1557	1125	2903	9343	869	986	1181	1171	637	121	1867	1	1
		Date of collection	Oct. 1-31, 1962	Nov. 1-30	Dec. 1-31	Jan. 1-31, 1963	Feb. 1-28	Mar. 1-31	Apr. 1-30	May 1-31.	June 1-30	July 1-31	Aug. 1-31	Sept. 1-30	Weighted average	Time-weighted average	Tons per day

GREEN RIVER BASIN -- Continued

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

Chemical analyses, in parts per million, water year October 1962 to September 1963 (Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidity)

pased	(Analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidity)	inimum mor	thly sp	ecific co	nductance, an	d maximu	m monthly	turnia	Lty)				
Stilon Tron Cal- M	Mag-	III.	Bicar-	aufoto	Chlorida Fluo-	O- Ni-	Dissolved	Har as C	Hardness as CaCO,	Specific conduct-			Tur-
		(Na)	bonate (HCO <sub>3</sub> )	(30,	(C1) (F)	le trate ) (NO <sub>3</sub> )		Calcium, magne-c sium	Non- carbon- ate	(micro- mhos at 25°C)	뙨	Color	bid- ity
00.00	ı		151	17	132		388	191	68	719	8.1	7	
80. 9.7	1		75	11	15		142	92	14	199	8.0	33	ł
	ł		-	1	!		1	1	1	1	1	1	200
00	į		158	16	105		339	182	52	612	8.2	9	1
7.7	}		89	14	16		123	86	30	199	7.8	22	1
	1		<u> </u>	1	I	_	1	1	!	!	1	1	150
10. 7.4	ł		140	22	102		312	180	99	590	8.1	n	!
7.2 .09	1		64	12	13		116	16	24	184	7.5	18	1
10. 0.7	;		132	18	70		1	154	46	486	7.8	2	1
7.1 .01	1		88	14	19		143	92	20	235	7.7	2	}
1 1	ļ		1	1	1		1	1	-	!	1	1	65
00. 4.9	;		137	20	62		254	153	41	457	8.0	4	1
7.5 .01	}		70	17	16		114	77	20	201	7.6	9	1
, 	;		!	;	•		!	1	1	1	1	1	380
00.	1		114	14	42		170	119	26	340	7.6	က	1
5.9	ļ		48	10	0.9	-	89	48	80	116	7.4	7	ł
			1	!	1		!	!	ł	1	1	1	2140

207

	3 20	- 40	5	2 35	- 205	3	9 25	- 750	3	2 10	1200	4	01 9	450	1 8	5 2	6
7.5	7.3	1	7.4	7.2	 	7.3	6.9	!	7.5	7.2	-	7.4	7.5	1	7.7	7.5	\ 
539	353	1	564	152	!	440	166	!	428	223		508	206	!	595	497	ŀ
41	34	-	51	18	!	42	23	!	34	16	-	34	11		44	34	1
157	128	-	163	99	-	136	16	-	146	98	\ 	163	88	!	190	168	-
303	196	-	303	100	\ 	250	16		238	138	1	292	122		330	264	1
68	42	1	92	8.0	1	89	6.0	1	54	16	1	73	10	-	06	89	1
18	59	1	24	15	1	16	14	1	20	12	!	14	11	!	16	16	1
140	114	1	136	28	1	116	65	<b>¦</b>	136	98	-	158	94	1	178	164	-
8.5	9.2	1	8.6	4.4	;	!		1	1	1		1	ł	!		!	1
49	36	!	49	19	1	1	1	1	- !	1	1	!		-	-	ŀ	!
90.	90.	1	.19	.32	1	.18	60.	1	.04	90.	1	.02	.05	1	.00	.02	
8.0	5.5		5.8	11	-	8.8	6.4	-!	==	9.6	!	9.6	9.3	1	6.2	6.6	-
160	1660	1660	1100	4380	654	755	3340	1010	2500	2170	3280	200	2200	3170	82	169	178
Apr. 21, 1963 (maximum conductance)	Apr. I (minimum conductance)	Apr. I (maximum turbidity)	May 2 (maximum conductance)	May 31 (minimum conductance)	May 27 (maximum turbidity)	June 5 (maximum conductance)	June 23 (minimum conductance)	June 30 (maximum turbidity)	July 31 (maximum conductance)	conductance)	July 8 (maximum turbidity)	Aug. 30 (maximum conductance)	Aug. 2 (minimum conductance)	Aug. 1 (maximum turbidity)	Sept. 30 (maximum conductance)	conductance)	Sept. 1 (maximum turbidity)

GREEN RIVER BASIN--Continued

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

	۵	•				
	Ave	age	59 74 36	35 45 49	59 64 72	4.4 4.4 9.9
		31	50	32	131	121
		30	24.50	5 1 3	60 67 78	76 74 58
		29	54 45 40	32	66 66 72	77 72 61
		28	5.2 4.4 3.5	32 38 51	60 65 75	76 72 60
		27	41 42 32	32	60 66 74	75 76 72 72 60
		26	42 42 38	32	60 62 73	76 74 59
963		25	56 46 33	32	61	75 76 76 74 59 59
Temperature (°F) of water, water year October 1862 to September 1963 (Once-daily measurement at 0700)		24	51 47 34	4 3 3 2	61 61 71	73 74 60
emp			57 44 41	33	64 62 70	75
Sept		22 23	59 48 32	32 32 47	44 44 60	74 71 49
ţ			62 49 39	4 33 2	66	71 74 70 71 67 64
r 1962 0700)		20 21	59 47 40	32 37 50	64 67	76 71 62
07		19	59 74 38	9 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	64 71 72	76 76 73 71 64 62
tobe t at		17 18	56 47 34	534	63 67	75
Oc		17	65 56 51 47 32 34	32 35 33 34 55 51	55 63 69 67 71 71	74 75 70 71 69
year	Day	16	67 50 36	32	51 68 71	71 72 71 71 71 71
er		15	66 47 32	37	53 69 73	71 72 73
wat 11y		4	9 4 6 2 5 5	33	56 74	73
er,		13	61 47 32	40 39 35 35 52 49	54 67 73	70 70 75 73
f water, water year October (Once-daily measurement at		12	65 49 32	36	56 64 73	47
g of		=	63 32	45 42 36 36 47 50	57	68 69 75 74 69 71
(°F.)		9 10	63 32	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	55 69 77	72 744 68
ire		٥	4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	39 43 37 39 48 47	57 67 75	70 72 76 74 68 68
ratu		8	65 49 38	96 9	56 74	22 69
эшре		7	63 35	98	2 4 4	73 72 78 76 66 69
Ĕ		9	64 60 0	37 39 32 32 50 46	55 64 70	74 74 77 77 69 66
		2	0 4 4 5 5 5	37	51 62 69	74 74 77 74 69 66
		4	61 64 63	36 45	69	75 78 72
		က	80 CV 4	32	54 57 70	77 75 77 78 81 72
		7	61 50 43	4 6 4 5 5	63 52 70	76 76 69
		-	502	3 4 4 6	61 55 68	76 75 17
	1	Month	October November December	January February March	April May June	July 76 76 August 76 76 September 71 69

209

### GREEN RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963

			ended sedimer	, water y		er 1902 to se	premoer 19		
		OCTOBE		ļ	NOVEMBE		<b></b>	DECEMBER	
	34	Suspen	ded sediment		Suspen	ded sediment	1	Suspen	ded sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	242	6	4	270	3	2	640	6	10
2 • •	1360	120	5 748	278	2	2	604	4	6
3	6010	678	11000	274 278	2 2	1	568 546	3 3	5
5	6130 4130	716	11800 3060	282	4	2 3	523	4	6
			ļ				H		
6	2200	116	689	278	5	4	505	4	5
7 8	1460 1130	48 34	189 104	778 282	5 7	4 5	492 478	3	4
9.	938	24	61	342	1 7	6	469	4	5 5
10	770	17	35	2520	63	S 683	451	7	8
11	662	14	25	6410	258	4460	433	5	6
12	572	10	15	5910	150	2390	330	1 3	3
13	613	126	S 59	3430	90	833	322	2	2
14	1290	110	383	2020	60	327	354	2	2
15	980	68	180	1480	37	148	354	4	4
16	721	24	47	1187	16	57	362	2	2
17	595	1.5	21	1010	14	38	362	1 3	3
18	523 492	11 12	16	920 1080	11	27	384 402	2	2 3
20	433	10	12	1570	19	80	410	2	2
						1			
21	410 384	6 5	7 5	1620 1520	19 17	د8 70	536 3510	13	19 5 1400
23	342	4	4	1380	16	60	7150	271	5230
24	318	5	4	1290	14	49	6710	158	2860
25	266	4	3	1180	11	35	4130	55	S 577
26	262	3	2	1020	10	28	2480	26	174
27	270	4	3	89.	7	17	2130	16	92
28	278	4	3	800	8	17	1980   1970	13 20	69
29	266 262	4	3	730 680	7 7	14	3800	67	106 687
31	262	3	2				4870	84	1100
Total	34571		28503	41202		9499	48255		12401
		JANUAR	Y		FEBRUAR	Y		MARCH	
1	4070	1 48	527	618	3	5	2520	23	156
2 • •	2930	31	245	770	8	17	4380	111	1310
3	2280	15	92	2810	90	S 826 2460	5810	165	2590 1900
5	1860 1580	11	55 34	4610 5240	198 285	4030	5530 10300	127 628	S 20200
6	1390	8	30	3460	96	897	19500	800	42100
7	1260	7	24	2620	48	340	22800	430	26500
8	1180	3	10	2120	20	114	23200	274	17200
9	1110	4	12	1790	13	63	17200	88	4090
10	1050	4	11	1520	10	41	6560	94	1660
11	980	3	8	2270	41	5 312	5470	219	5 3780
12	926 1070	2 3	5 9	5200 5640	214 138	3000 2100	15200 20500	772 418	31700 24000
14	1340	6	22	4440	72	863	22000	313	18600
15	1250	6	2.0	3380	33	301	20500	176	9740
16	1020	6	16	2620	23	163	9820	63	1670
17	890	4	10	2080	13	73	6440	132	5 2450
18	848	4	9	1850	10	50	10200	314	8650
19	836 815	2	9	1790 2400	12	58	12400 11400	241 104	8070 3200
							1)		ı
21	795	3	6	355° 3640	41	393	8040 5480	78 53	1690 784
22	694 550	2 2	4 3	2900	23	180	4060	37	784 406
24	451	3	4	257	15	104	2200	34	302
25	450	2	2	2820	14	106	2820	24	183
26	500	2	3	3060	14	116	2640	26	185
27	500	2	3	2920	19	150	. 2780	22	165
28	550 564	, 3	4	2590	14	98	2620 2310	22	157 131
30	564 572	3	ļ <del>4</del> 5	!		: ==	2030	17	93
31	577	ž	3				1820	17	84
Total	34888		1193	81278		17337	289620		233746
		1		Ľ	<del></del>	l		<u> </u>	

S Computed by subdividing day.

### GREEN RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963--Continued

Content   Cont	Ļ		APRIL		+	- MAY		<del></del>	JUNE	
Day   clase   clase   concentration   concen	į	M	Suspen	ded sediment		Suspen	ded sediment	. N.	Suspend	ed sedimen
1500	Day	dis- charge	concen- tration (ppm)	per	dis- charge	concen- tration	per	dis- charge	concen- tration	Tons per day
2   1527   16   66   11JU   5   18   1270   51   4   1290   8   28   872   6   14   868   32   5   1209   8   28   872   6   14   868   32   5   1209   8   28   872   6   14   868   32   5   1209   8   28   872   6   14   868   32   6   1130   6   18   654   2   4   7.5   17   7   1090   6   18   595   2   3   2260   116   8   1050   6   17   554   1   1   2010   83   110.   948   7   16   460   4   5   740   24   111.   878   7   16   460   4   5   740   24   112.   825   6   13   428   6   7   640   19   113.   875   5   13   428   6   7   640   19   113.   745   5   13   428   6   7   640   19   113.   745   5   13   428   6   7   640   19   114.   860   5   11   474   26   33   914   55   A   115.   712   6   12   420   2   2   2   640   18   117.   862   5   9   1780	1	1660		58	884	5	12	203∪	120	658
3 1400 11 42 1070 8 23 930 27 5 1299 8 28 78 872 6 14 8868 32 5 5 1299 8 26 730 3 6 735 32 5 1299 8 26 730 3 6 735 32 5 1299 8 26 730 3 6 735 32 6 1299 8 26 730 3 6 735 32 6 1299 8 26 730 3 6 735 32 6 1299 8 26 730 3 6 735 32 6 1299 8 26 730 3 6 735 32 6 1299 8 128 28 28 28 28 28 28 28 28 28 28 28 28 2		1527	16	56	1100	6	18	1290	51	178
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30. 564 28 S 46 200 6 3 85 3 31. 2500 173 1170 185 7 3	29		1.6	. 22	222	5		90		1
31 2500 173 1170 185 7 3	30	564	28	'S 46	200	6	3	85	3	1
Total 36302 16810 19755 4275 3629		2500	173	1170	185	7	3			
	Total	36302		16810	19755		4275	3629		36
Total discharge for year (cfs-days)	Total	discharge	for vea:			<u> </u>			i	681589

GREEN RIVER BASIN--Continued

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

	Mathod	of of	analysis	SBWC	SBWC
			2,000		
			000 .1		
		ters	200		
		nillime	. 250 0		-
er;	nent	Percent finer than size indicated, in millimeters	002 0.004 0.008 0.016 0.031 0.062 0.125 0.250 0.500 1.000 2.000	00	00
1963 ive wat	d sedin	Indicate	062 0	001 66	99 1
tember in nat	Suspended sediment	n size i	031 0.	96	88
to Sep ion; N, ter)	Sn	er tha	016 0.	01	2
1962 teantati		ent fin	08 0.0	8 8	6
tober ; D, de n distil		Perc	0.0	51 62	 
persed persed ; W, in			0.0	5.1	- 65
tter ye	_		o	41	43
l sediment, wa ibe; C, chemica sual accumulati	Codimont	discharge	(tons per day)		
ze analyses of suspended sediment, water year October 1962 to isis. B, bottow withbraval tube; C, chemically dispersed, D, decamiation, P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water).	Sediment	concen- tration	(mdd)	841	843
Particle-size analyses of suspended sediment, water year October 1962 to September 1963 Methods of analysis B, bottom withdrawal tube; C, chemically dispersed; D, Geardation; N, in native water; P, pipet; S, sleve; Y, visual accumulation tube; W, in distilled water)		Discharge (cfs)		14100	3310
articly ods of a	Water	per-	(°F)		
(Meth		ling	poruc		
		Time ling per-		0020	0020
		Date of collection		Mar. 12, 1963	July 8

### GREEN RIVER BASIN -- Continued

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

LOCATION. --At Manmoth Cave Ferry crossing, 350 feet upstream from gaging station, which is 0.2 mile downstream from Echo River, and 0.8 mile southwest of Manmoth Cave, Edmonson County.

DRAINGE ARRA.--1, 983 square miles, of which about 444 square miles does not contribute directly to surface runoff.

Records AVAILABLE. --Chemical analyses: September 1959 to September 1953.

Rater temperatures: October 1959 to June 1951.

REMARKS.--No dissolarge records available.

	Color																							
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Specific conduct- ance	<u>ت</u> تو	239	377	468	488	418	329	355	398	468	203	461	307	315	373	329	398	386	293	267	569	267	146	187
Hardness as CaCO,	Non- carbon- ate	1	1 1	{	1	1	!	!	1	1	1	ł	!	1	!	1	1	!	1	1	1	!	1	!
	Calcium, magne sium	1	1 1	ŀ	ł	1	1	!	1	!	ļ	1	1	1	1	١	ļ	1	1	1	ł	1	ŀ	1
. 1963 Dissolved solids	~ a																							
tember	(NO <sub>3</sub> )	1		1	1	1	1	1	1	1	!	!	1	ļ	1	ļ	1	1	ŀ	!	1	!	1	1
to Sep	(F)	1	1 1	1	1	1	1	1	!	1	i	1	1	1	1	1	1	1	1	!	!	1	1	1
Chemical analyses, in parts per million, water year October 1962 to September 1963 (Cal- Mag Po- Bicar Sulfate Chloride Fluo Ni- Soliso (Cal- ne- Sodium Tas Bicar Sulfate Chloride Fluo Ni- Soliso	(CI)	61	36	99	29	4	33	38	45	65	70	62	28	29	40	40	42	38	56	30	21	17	7.5	11
year Oct	(80°)			1	1	1	1	!	1	1	1	1	1	1	1	1	1	1	1	!	!	1	1	1
, water Bicar-	bonate (HCO <sub>3</sub> )	1	1 !	1	1	1	1	1	i i	!	!	ł	1	;	ŀ	1	1	1	1	1	1	į	1	1
Po- tas-	sium (K)															_								_
rts per m	(Na)																							
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nalyses Cal-	(Ca)																							_
mical a	(Fe)	ŧ	1 1	i	ł	ł	!	;	}	l	;	!	!	;	¦	ł	1	ŀ	ł	l.	1	ł	ł	!
SH	(S1O <sub>2</sub> )																							_
Mean	discharge (cfs)																							
:	Date of collection	Oct. 6, 1962	Oct. 20	0ct. 29	lov. 3	Nov. 10	Nov. 17	Nov. 24	Dec. 1	Dec. 8		Dec. 22		Jan. 5, 1963	Jan. 12	Jan. 19	Jan. 26	Feb. 2	Feb. 9	Feb. 16				Mar. 16

111111	111111	111110.	7.0	1111111111
242 304 367 413 468	387 369 518 335 180 318	329 329 339 386 386 386	328 311 242 372 372 416	444 4444 5044 528 4528 4653
111111	111111	8	111118	%
111111	111111	134	1146	17.8
111111	111111	3.4	3.1	1       4
		0.1	111114	1111911
16 339 50 50 56 56	43 36 30 34 34	220 221 44 45 45	0481844 048844	45 48 62 67 70 71
111111	111111	1	111118	!!!!%!!
111111	111111	128	142	172
		  a0.01	1111100.	
23, 1963				
23, 1963	4. 11 19 25 1 8	15 22 29 6 6 13 16	20. 27. 3. 10. 21.	24. 31. 14. 18. 21. 28.
Mar. 23, 1963 Mar. 30 Apr. 6 Apr. 20 Apr. 27	May 4. May 11. May 13. May 25. May 25.	June 15 June 22 June 29 June 29 July 6 July 13 July 13	July 20 July 27 Aug. 3. Aug. 10 Aug. 17 Aug. 21	Aug. 24 Aug. 31 Sept. 7 Sept. 14 Sept. 18 Sept. 28 Sept. 28

a In solution when analyzed.

### GREEN RIVER BASIN -- Continued

## 3-3110. NOLIN RIVER AT KYROCK, KY.

LOCATION. — Temperature recorder a gration, 70 feet downstream from Dismal Creek, 0.3 mile downstream from Nolin River DRAINGR ARBA.—707 square miles (including that 0.9 mile northeast of Kyrock, Edmonson County, and 7.5 miles upstream from mouth. DRAINGR ARBA.—707 square miles (including that of Dismal Creek), of Which about 223 square miles does not contribute directly to surface exnoff. The contribute of the contribute

	Aver-	age	.13 9 9	90 60	3.9	3.6 3.6	1 1	1 1	9 9	77.6 0.0	5.5	11	7.7	71
- [	Á	ra .												
		31	52	11	37	3 35	11	53	- ! !	2 4	1 1	7.	7.	
		30	22	4 4	37	35	11	55	9 7 9	54	55	7.7	7.5	717
-		59	122	4 4	36	3.5	11	53	65	54	20	L 1	55	7.
		82	51	4 4	3.6	33.55	11	53	99	54	55	7.3	7 17	7,1
		27	17.0	4 4	36	W W	1.1	52	200	2,4	50.00	73	2.2	2.5
		56	51	47	36	35	1.1	5.2	6.7	57.0	555	57.	1.4	7.7
		22	20.0	47	36	36	1.1	53	9 0	5 4	35	73	74	7.1
		24	960	47	36	36	1.1	52	4.6	533	50	1 1	4 4	717
		23	61	47	36	36	11	5.5	6. 6.0	54	3.5	1.1	74	7:
		22	62	47	36	36	1.1	22	79	533	56	11	7.5	7.7
d d		21	62	47	35	36	1.1	52	29	53	56	1-1	5/2	7.1
ethyl alcohol-actuated thermograph)		20	62	4 4	34	36	11	52	58	5.5	56	1.1	74	17.
erme		61	6.5	2 4 8 8	36	3 35	1.1	51	3 6	53.4	20.00	1.1	74	71
티		81	65	6 4	36	35	11	51	60	54	55	1	74	11
ate		11	99	4 4 3	3.6	3.5	1 1	51	5.9	5.3	0 L	(C (U)	74	71
tctu	Day	91	999	47	36	35	1.1	5.1	63	53	20	5.8	7.4	7.1
0		15	999	4 7	36	36	1.1	50	63	R (1)	56	0.00	74	17
lcoh		4	66	6 4 8	36	38	11	50	62	53	57	9.0	74	12.7
1 2		13	9 9	t 4 6	35	33	11	200	62	5 5	5.6	(C) (C)	r r	2.5
thy		12	7 7 9	0.00	37	00	1.1	5 C	62	52	in in	5.8	15 15	
as e		=	469	t t	34	2 2 m c		50	62	5.5	55	80 60	74	71
nno		2	6.9	0.00	3.0	33	1:	50	62	52.50	555	6 8	74	7.7
(Continuous		6	63	4 t	4.1	7.6	11	50	59	52	55	5.8	74	17
ဗ		80	63	6 4	75	37	11	909	60	63	7. Y.	5.88	74	7.1
		-	62	4 4 0 8	44	937	11	11	500	63	50	8 2	74	7.2
Ì		9	62	0 00	44	7 27	36	11	10 m	63	5.5	57	74	6, 2,
		2	62	51.	2 2	37	34	11	58	63	55	5.7	74	73
		4	62	52	u u	37	34	1 1	57	69	5.5	57	74	73
		6	62	52	2.0	2 2 7	\$ \$ 3 3	11	5.5	63	2.5	4.00	74	73
		2	6.0	52	45.5	37	34	11	9.0	<b>79</b>	R R	8 40	74	73
-		-	63	52	45.0	37	34	H	5.5	63	5 5	5.56	73 7	73
		Ь	1 1	11	11				1:		11	11	11	-
	;	Month	October Maximum . Minimum .	c ~	December Maximum . Minimum .	Eε	mum mum	March Maximum . Minimum .	April Maximum . Minimum .	cimum	June Maximum . Minimum .	July Maximum . Minimum .		September Maximum

### GREEN RIVER BASIN -- Continued

## 3-3130. BARREN RIVER NEAR FINNEY, KY.

DOCATION, --Temporature recorder at gaging station 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 Dani (under construction), and 2.1 miles southwest of Finney, DANIANGE ARRA. --940 square miles, of which about 77 square miles does not contribute directly to surface runoff. RECONDS AVAILABLE.—"After temporatures: August and September 1961, unpublished; November 1967 to September 1963.
EXTREMESS, 1962-65.—"Meter temporatures: Maximum, 917 and 1961, unpublished where mined.
REMARKS.—No temporature record Dec. 12 to Jan. 7, Jan. 25 to Feb. 3; minimum and determined.

Temperature (°F) of water, November 1962 to September 1963

	Aver-	age	1:	11	1	(A (D)	52	4 4	76	81	6.0	8 C	66
		31	: 1	11	1 (	11	61	11	2 2	1 1	2, 2,	7 5	1 1
		30	23	1.1	; '	11	51	67	0.0	20 00 00 00	7.7	72	79
		59	2 4	1.1	1.1	: 1	7 2	7 0	0 f-	45 85	ź.	20	\$ ¢
		28	60	1.1	1:	0.0	9 9	4 4	78	2 3	2.2	7.	194
		27	1.1	1.1	1 1	25 23 25 45	5.5	\$ 4°	77	0 50 0 50	0 C	7 7	° ° °
		56	11	1.1	1 1	3.9	50.00	44	76	8 6.3	7.3	7.7	67
		25	1.1	1.1	11	30,0	55	204	75	2 8	2.6	77	ę,
		24	1.1	1.1	386	33 4	1 4	65	73	5 5	3 SC	11	6.7 6.t
		23	1.1	1.1	3 5	υ c 2 s	7 7	6 6 55	7.5	8 7	80	77	0 0 0 0
		22	1.1	1.1	36	35	5.5	67	74	30 30 30 30	2.0	7.7	70
(qd		21	11	1.1	35	3 %	3,5	72	76	77	a a	7.7	6.5
ethyl alcohol-actuated thermograph)		20	1.1	- 1	22	č ;	40.0	4.6	78	77	80	77	99
erm		19	11	1.1	22	50 °	5.4	63	7 6	77	2 60	77	8 to
the character		81	11	1.1	55	33 X3	45	63	66	77	5 2	77	0 to 0
ate		17	1.1	1.1	2) 2)  -  -	2 c	4 4	63	99	77	20 H	7.7	70
actı	Day	91	1.1	1.1	20 1-	~ X	52	63	65	7.8	.D. D 5 20	7 , 7 -1 G	63
-100		15	1 1	1.1	מ מ	2.9	52	63	65	78 76	\$ ~	8 7	63
lcol		14	11	1.1	2, 3	4 ,	20 5	63	6.5	3 48	385	9 7 6	8.6
/1 a		13	1.1	1.1	47	5.0	35	6.3	6.5	78	7.8	9-77	5.62
etp		12	1.1	, !	4 4	51 CF	4 4 0 C	6.6	4.2	787	78	78	6.6
		=		3.8	n t t t	6.6	5.0	63	65	7 27	7 4	78	63
1 nuc		2	1.1	3 F	C1 ←4	5.2	30	63	65	7 3	4 5	76	4.6
(Continuous		6	11	0,7	44	6.6	6.5	6.3	6.5	7.8	9 1	7.5	63
٦		ω	11	33	44	<i></i>	23	49	9 9	138	2.5	7 7	4.6
		7	11	450	1.1	39	50	40	65	7.8	9.0	7 9 7	63
		9	11	47	11	3.9	0 4	4.4	2. c.	77	7 8 7	800	6.6
		2		4 4		36	4 4	4 4	65	7.8	7.9	8.2	5.5
		4		† † † †	1.1	36	4 4	6.5	66	78	9 2	84 82	64
		က	1	4 4		1	4 4	54	96	7 8 7	91	8.7 8.4	44
Ì		8	1 1	4 4 5	11	11	t t	62	66 66	79	9 80	9 ¢	99
		~	11	4 5	1.1	1 1	4.0	62	67	8 U 7 9	81	α α ο ο	7.5
	100	Month	November Maximum	December Maximum Minimum	January Maximum Minimum	Maximum	Maximum Minimum	April Maximum Minimum	Maximum Minimum	Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### GREEN RIVER BASIN--Continued

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

LOCATION.—Temperature recorder at gaging station at College Street bridge, 600 feet downstream from bridge on U.S. Highways 31# and 68 at Boxling Green, Marron County, 800 feet upperceam from Louisville and Nashville Railroad bridge, 6 miles downstream from Contribute States. The States of Which hourt also greater miles does not contribute directly to surface runoff.

Railroad States Creek, and 8.9 miles upstream from Genure miles does not contribute directly to surface runoff.

Railroad States Creek, and 8.9 miles greater miles does not contribute directly to surface runoff.

Railroad States Creek, and 8.9 miles greater 1950, october 1959 to September 1960.

Railroad States Creek States Creek States

	Aver-	age		61 64	7.7	20	37	38		35	37	33	37	64	52		09	63	65	69	14	1.1
	Ą	.0				41											_					
		31		55	!	ł		37		32	32	1	1	9	63		1	1	65	69	1	Ī
		30		53	. 5 7		35	37		32	32	1	1	53	58			<b>7</b> 9	67	99		7.9
		29		5.2	7 7	48	34	38		1	32	1	1	50	58		63	99	69	6.8	7.5	79
		28		54	4.4		3.2	38		1	32	37	0,4	20	99			79	9	65	76	78 78
		27		52	6.7	4 8	33	30		:	32	3,5	3.8	51	55		79	6.5	6.5	67	16	20
		56		53	44	6,4	34	38		32	32	32	35	64	53			6.5	65	29	7.5	52
_		25		5 5	4.7	20	30	38		1	32	34	39	6 4	55		9	65	49	65	16	20
1963		24		58	4.7	6,4	3.2	35		ì	;	36	8.	53	54			67	6 5	20	75 75	77
		23		60	4.4	20	3.8	37		32	1	33	38	6 7	55		65	67	63	99	7.5	17 97.
September and 1700)		22		62	0.7		32	37		3.2	35	1	32	8 4	53		68	20	89	89	73 72	15 76
Sep		21		64	5	52	34	34		i	32	32	32	47	51		65	20	7.0	73	73	75
to 630		20		63	7		35	36		32	34	34	0,4	90	53			96	20	74	7.5	73
of water, water year October 1962 to Iy measurements at approximately 0630		19		66	4.6	4.8	34	37		32	37	34	0,4	54	5.5		62	63	73	74	4	77
er ]		18		63	4.8		32	36		34	36	35	39	51	54			99	7.0	72	73	16 76
ctob		11		63	4.5	4.8	32	34		32	36	32	3.8	54	5.5		57	62	70	7.1	75	76
r O	Day	16		20	4	6.4	34	34		35	36	32	38	5.1	3,4			9	7.0	73	7.5	78 76
yea at a		15		7.1	4	20	32	33		32	34	1	34	64	52		54	5.8	7.0	72	76	7.8
ter ts		14		20	6.2		3.2	32		35	35	32	35	64	51		_	09	6.8	7.5	16	80 78
<pre>tture (°F) of water, water ye (Twice-daily measurements at</pre>		13		70	1	4.8	1	32		0,4	7	3.2	3.8	2	54		57	6	6.5	7.0	7.7	80
ter		12		63	4.4	48	1	3.2		4,	4	32	34	52	53			9	6.8	7	16	80 80
f wa		=		62 58	4	6 7	;	3%		43	45	32	34	6 7	53			09	68	7.1		_
,) (11)		10		63	4		1	32		4	4 2	0 4	4 1	48	52			2,0	68	7.2	7.8	80
Temperature (°F) (Twice-dai		6		68	7		38	36		1 4	77	32	4.	0,0	51			ç.	6.7	7.1		7.5
rure		8		63	4		<b>4</b> C	4.5			40	3.2	<b>⊅</b>	4	5.1			69	6.5	7.0	16	7.4
era.		7		64	4.7		4	4.5			4.1	32	6	4	50		_	62	69	50		7.7
Гешр		9		65	4		2 4	4,5		9	04	32	33	4 8	5.1		24		62	67	7.2	4.
		2		65	67		45	4.5		-	39	32	35	20	05		_	59	79	65		73
		4		64	7		45	£ <b>7</b>		35	38	32	34	4.5	4 8			.6	59	63	71 70	73 73
		3		65	5.2		4.1	4 8		35	38	3,2	33	43	9 4		_	6.5	5.6	6.1	_	_
		2		65	ŝ		9 7	64		34	37	32	33	39	43			6.5	54	9	7.3	75 73
		_		65	5.0		4	53			37	32	32	35	3.7	_		63	55	58		
	Month	Month	October	10 E	November	p.m	а.п.	D.H.C	January	а.п.	Pebraarv	а.н.	March	а.п.	p.H.	April	а.п.	p.m.c.	B. 8	p.m.	а. н.	D.B

7.5	78	76	7.8	10	7.3
76	78	74	7.5	1	1
7.5	79	14	46	63	49
76	78	1.6	8	79	67
7.7	9	92	7.7	69	7.0
76	78	۲۶	78	7.0	7.1
7.5	48	16	78	69	10
75	28	75	7.9	67	69
75	90	42	7.8	67	7.1
7.6	28	74	76	6.8	7.0
7.3	¢	73	76	69	7.2
74	- 8	75	7.7	2	7.4
74	60	73	4.	7.1	45
76	92	74	75	70	73
73	1.	14	48	2	75
74	œ	7.	7.7	7.1	73
74	10	73	78	7.1	74
73	9	74	16	7.1	75
7.5	20	75	11	2	73
74	τ,	77	7.8	2	76
7.5	-	77	2	7	16
-23	•	20	80	2	7.5
74	Ĺ	∞ ~	80	20	7.5
7.5	2	5	7	2	7.5
76	-	٥ ۲-	8	70	7.5
7.5	<u>c</u>	7.7	6	7.1	7.5
76	-	46	80	12	7.5
7.5	-	9.	E	74	16
76	-	90	80	74	16
76		~	2	74	7.7
76	2	7	7.8	74	76
7.8	- 1	*	77	72	77
July Ram 78 16 76 76 75 75 75 76 75 76 75 76 774 73 75 74 75 72 75 74 75 76 74 76 75 76 76 76 76 76 76 76 76 76 76 76 76 76	August 18 78 78 78 78 78 78 78 78 78 78 78 78 78	8. II. 14 74 75 78 80 76 76 77 79 78 78 78 78 78 77 75 74 74 74 74 74 75 75 75 75 75 75 75 75 75 75 75 75 75	P	B. H.	P.m 77 76 77 76 76 75 75 75 75 76 76 76 78 75 76 6 78 79 75 76 76 78 78 78 78 78 78 78 78 78 78 78 78 78

### GREEN RIVER BASIN--Continued

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

EXTERMENS. 1696-63 --Water temperatures: Maximum, 87°F Aug. 35°F Aug. 35°F Aug. 35°F Aug. 35°F Aug. 36°F A

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### GREEN RIVER BASIN -- Continued

3-3180.1. ROUGH RIVER AT ROUGH RIVER DAM, NEAR FALLS OF ROUGH, KY.

LOCATION. --Temperature recorder at stage station, 800 feet downstream from center line of Rough River Dam, 1.5 miles upstream from Cat. Lat. Act. Creek, and 3.5 miles northeast of Falis of Rough, Grayson County.

BENDRIAMS ARRA.--454 square miles, of which about 110 square miles does not contribute directly to surface runoff.

RECORDS AVAILABLE.--Water temperatures: July 1962 to September 1963.

EXTREMES. July 1962 to September 1963.--Water temperatures: Maximum, 72°F Sept. 16, 26-29, 1962; minimum, 37°F on several days in December 1963 and January 1963.

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GREEN RIVER BASIN--Continued

### GREEN RIVER BASIN--Continued

3-3195. ROUGH RIVER AT DUNDEE, KY.

LOCATION: —At suxtlary gaging station at bridge on State Highway 69 at Dundee, Ohio County, 7.1 miles downstream from Caney DRAINGA AREA.—The square miles.

DRAINGA AREA.—The square miles.

EXTREMES, 1962-63.—Hater temperatures: October 1989 to September 1967.

EXTREMES, 1962-63.—Hater temperatures: Maximum, 64 F Aug. 9; minimum, freezing point on many days during December to February.

EXTREMES, 1969-63.—Hater temperatures: Maximum, 69 F Aug. 3; minimum, freezing point on many days during Winter months. REMINES.—Stream frozen Dec. 10-19, 38n. 16, 3an. 21 to Febr. 4.

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GREEN RIVER BASIN--Continued

3-3211. POND RIVER NEAR SACRAMENTO, KY.

LOCATION.--At bridge on State Highway 85, 12 miles upstream from mouth, 3.0 miles southwest of Sacramento, McLean County, 3.9 miles downstream from Log Creek, and 45.5 miles downstream from mar Apex.

DRAINAGE AREA.--52 square miles.

RECORDA VARIABLE.--Chemical analyses: October 1955 to September 1963.

RECORDA VARIABLE.--Chemical from Strip mine areas. Samples for iron and manganese filtered clear when collected. Acidity determined to pH 7.0 and is potential free. No discharge records available.

Chemical analyses, in parts per million, water year October 1962 to September 1963

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	L		Col- or								
			Hd	3.5	3.5	4.3	4.2	6.2	6.9	6.1	6.5
	Cranifia	conduct-		1560							
		Total	aciu- ity as H <sup>+</sup> 1	3.5	2.2	4.	9.	۲.	0.	0.	0
	Hardness	aco,	sidue cium, carbon 189°C) magne ate H <sup>+1</sup> n					1			
1000	Hard	as C	Cal- cium, magne- sium	609							
nebreme.		Dissolved	solids (residue at 180°C)					201			
200			trate (NO <sub>3</sub> )					1			
1000		í	ride (F)	1.5	1,5	1	1	1	!	1	1
chemical analyses, in parts per militon, water year occoper 1902 to bepremier			Chloride (C1)	72	80	21	7.2	10	113	75	318
TOTAL METERS			Sulfate (SO <sub>4</sub> )	740	697	284	450	114			
777 7			bonate (HCO <sub>3</sub> )				0	17			
d corn	ľ	Po-	4.7	3.8	1	1	1	1	1	ŀ	
d at feed			Sodium (Na)	70	73	1	1		1	1	1
T GIIGT		Mag-	ne- sium (Mg)	72	65	1	ļ	1	1	;	ļ
THOM TO		Č	cium (Ca)					ŀ			
		Man-	ga- nese (Mn)	0.6	2.1	.36	0.9	1.1	66.	3.8	.44
			Iron (Fe)	1,6	2.3	1.7	1.8	.33	.14	.45	.29
		1	inum (A1)	12	7	2.7	3.2	0.	٥.	۲.	I
			Silica (SiO <sub>2</sub> )	14	13	9.2	9.5	6.2	4.8	5.8	2.6
		i	Date of collection	Oct. 31, 1962.	Dec. 5	Jan. 5, 1963	Feb. 6	Apr. 4	May 3	June 6	Sept. 5

### WABASH RIVER BASIN

3-3355. WABASH RIVER AT LAFAYETTE, IND.

LOCATION.--Temperature recorder at gaging station, 20 feet downstream from Brown Street Bridge in Lafayette, Tippecanoe County, and 5.1 miles downstream from Widden Creek, and at mile 311.9.
BEONING ARM.--7, 247 square miles.
RECORDS AVAILABLE.-Water temperatures: July 1994 to September 1963.
RECORDS AVAILABLE.-Water temperatures: Maximum, 80°F Aug. 13, 14; minimum, freezing point on many days during December to March.
EXTREMES, 1994-63.--Water temperatures: Maximum, 80°F July 30, 31, 1954; minimum, freezing point on many days during winter

months.

REMARKS. -- Some regulation at low stages caused by powerplants above station,

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

			ı					-	Continuous	Tra		e cui r		arconol-actuated thermography	7.10	פניות	A CE	3	erm	)gra	bu'							ĺ				
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October Maximum Minimum	09	09	09	960	5.0	59	5.0	58	58	58	57	57	57	25	56 55	9 9	55 55	5.50	5.5	55	54 53		53 51 51 51		51 50		4 6 4 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		4 4 4 8 4 4 8 4 4 4 4 4 4 4 4 4 8 4 4 4 8 4 4 8 4 4 8 4 8 4 8 4 8 4 8 4 8 4 8 4 8 8 4 8 8 4 8		8 4 4	55
Maximum	47	47	4 4	4 4	4 6	45	45	45	44	4 4	44	45	4 2 4 4 5 4 4 5 4 4 5 4 4 5 4 4 5 4 5 4	<b>4 4 4 4</b>	1 1 1 1 1 1		7 7 7 7 7 7	7 7 7 7 7 7	1 1 1 1 1 1	43 4	43 42		42 42		42 41		41 41		41 40		11	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
Maximum	0 4	000	0 4	0 4 0	0,0	0 0 4	39	39	9.8	38	37	37	34	36	36 3	20.00	35 3	3.5	34 3	9.8	33 32 32 32		32 32 32 32		32 32 32 32		32 32		32 32		32	36
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April Maximum Minimum	4 4	9 4 4	4 4 6 4	8 8	80 80	8 8	4 4 8 80	4 4 0 80	644	4 4 0, 80	4 4	# # # # # # # # # # # # # # # # # # #	8 7 7	8 8	8 8 4 4	6 4 4	6.00	501	52 5	523	533	533	53 51		50 50		50 52		5.5	52 -		50
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Maximum	62	64	65	99	99	67	68	68	69	69	69	69	69	8 8	889	8 8	8 8 9	8 8 9	69	69	9 69	69	68 69		70 71 69 70		72 73		73 7	74 -	11	6 9
July Maximum Minimum	75	76	76	76	75	74	73	72	72	72	72	73	27.8	73	73 7	73	74 7	7.7	76 7	76	76 7	76 7	76 76 76 76		77 78		78 78		787	7 8 7	97	75
August Maximum Minimum	79	79	79	79	79	79	79	97	79	79	79	79	79	90	78 7	77	77 77	. 67	76 7	75	74 7	75 7	75 7	76 7	76 76 76 76		76 76 76 76		7 67	75 7	75	77
September Maximum Minimum	75	75	75	7.2	75	7.5	74	74	75	75	75	75	75	74	72 7	72	73 7	73	74 7	2.2	74 7	73 6	70 69		68 68 68 67		67 67		67 6	67 -	11	72

### WABASH RIVER BASIN -- Continued

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

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

near Sullivan Sullivan County.

MAINANGE MAS, -125 GOOD Square miles, approximately.

MECORDS ANALABLE.-Chemical analyses: July to September 1963.

Water temperatures: July to September 1963.

Market temperatures: July to September 1963.

Market temperatures: July to September 1963.

Market temperatures: July to September 1963.

Market temperatures: July to September 1963.

Market temperatures: July to September 1963.

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Market temperatures: July to September 1963.

Market temperatures: July temperatures.

Market temperatures.

Market temperatures.

Market temperatures.

	Organics Phe-Alkyl	Col_nots Den- or as zene CeHs sulfo- OH nate (ABS)		0.0	٦.	!	-		7.	2.	!	!	-	:	Τ.	ł	-
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	To-Specific tal conduct-	acid-ance ity (micro- as mhos at H+1 25°C)		285	516	603	394		206	260	594	441	769	,	644	656	556
	듇혛	acid- ity as n H+1															
	Hardness as CaCO,	Non- car- bon- ate		1	1	65	47		1	!	84	89			1	9	9
	Har as C	Cal- clum, mag- nesium		1	!	275	188		ł	ł	268	212	1		ļ	293	253
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63	Phos-	us PO.		0.30	.38	1	ł		.36	.32	-	1	S	;	.47	1	ł
ber 19	į.			1	1	1.0	5.4		i	ŀ	2.6	4.1			i	3.6	1.0
eptem	Fluo-	ride (F)															
Chemical analyses, in parts per million, July to September 1963	:	Chloride (Cl)		1	1	24	12		1	1	36	13	;		1	31	18
llion,	:	Sulfate (SO <sub>4</sub> )		16	68	46	40		65	74	68	64	76	2	7.7	78	72
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rts pe	Bi-	ate HCO,		1	1	256	172		1	!	224	176	ł		!	284	236
in pa	Po-	stum (K)															
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	Man-	ga- nese (Mn)															
		(Fe)															
	Alu-	- mum (A)															
		(SiO <sub>2</sub> ) num															
	Mean	discharge (cfs)															
	Date	collection	July 5, 1963 (maximum	7/1-10)	7/21-31)	monthly)	monthly)	Aug. 1 (maximum	8/1-10)	8/11-20)	monthly)	monthly)	Sept. 10(maximum	Sept. 27 (maximum	9/21-30)	monthly)	monthly)

WABASH RIVER BASIN--Continued

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

	ے ا	.	
	Ave	age	79 78 73
		31	82 72
		30	81 76 68
		29	81 77 73
		28	
		27	82 83 75 76 68 68
		26	81 78 68
		25	80 77 68
		24	80 79 74 78 70 68
		23	
963		22	82 83 72 73 76 72
Temperature (°F) of water, July to September 1963		20 21 22 23 24 25 26 27 28	82 72 76
embe	l I i	20	84 71 74
Sept		19	82 84 72 71 75 74
ç,		12 13 14 15 16 17 18 19	80 72 74
11y		17	81 80 76 72 74 74
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ater		15	77 78 74 74 73 74
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٤		12	75 74 74 75 82 83 81 81 77 78 78 77
ture		=	74 81 78
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remp.		6	75 82 77
-		8	75 76 83 84 74 76
		5 6 7 8 9 10 11	75 83 74
		9	81 82 72
		5	77 83 75
		4	1 8 4
		3	82 84 75
		2	81 81
		_	82 81 74
	Month	THOUSE .	July August September

WABASH RIVER BASIN--Continued

3-3420. WABASB RIVER AT RIVERTON, IND.

downstream from Turtle Creek.

BARIAGE AREA.--13.10 square miles, approximately.

BROORDS AVAILABLE.-water temperatures: July 1994 to September 1961, October 1962 to September 1963.

EXTREMES, 1962-63.--water temperatures: Maximum, 83°F July 22, 23, Aug. 9; minimum, 35°F Feb. 4-12, 17-20.

EXTREMES, 1964-61. 1962-63.--water temperatures: Maximum, 91°F July 20, Aug. 29, 1954; minimum, freezing point on many days during winter months. LOCATION .-- Temperature recorder at gaging station at Illinois Central Railroad bridge at Riverton, Sullivan County, 0.6 mile

		-		- (		۱				Cont	ting	sno	us eth	yl a	l alcohol-s	ho1-		ctuated	đ ti	therm	thermograph)	aph)	ograph)									1	
Month																Day	Ą															Aver	-L-
Month		_	2	3	4.	2	6 7	_	6 8	<u> </u>	11 01	12	13	41	12	91	17	18	19	20	12	22	23	24	25	26	27	28	29	30	31		age
October Maximum . Minimum November	::	6116	611	61 61		61 61		61 61	1 61	1 61		62 62	62	2 62	63	2 63	633	693	63	62	61	1 61	61	260	5.9	58	57	56	55	55		99	0.0
Maximum . Minimum . December																														_			00 0
	1 1	* * * *	3 4 3 7 3 7	94 24		46 47		44 44		43 42		42 41	÷ ‡	1 41	7 9	10	3.6	36	39	3 6	2 9	200	4 4	4 6	3 9	4 4	39	39	9 6	39	3.0	424	<b>4</b> ~4
January Maximum . Minimum .	::	3.9	9.9	39 39		39 39		39 39		39 41		42 42		42 42	2.3	1 41	3.0	9.6	3 6	9.6	30	33	3,88	9 8	38	3.8	388	388	38	37	37	8.8	0.0
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April Maximum . Minimum . May.	::	53.4	55	56 57		57 57 57 56		56 56		56 56		56 56		55 55	55.55	5.5	55.	5 27	58	5 5 8	0, 10 0, 10	9 58	58	260	99	260	5.9	58	58	57		56	٠, ٩
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ximum imum		73 7	7 47	74 74 74 74		75 75		74 78		78 80		80 80 80 80		90 80	19	9 79	79	79	79	2 2 2 9	79	9 79	78	3 78	718	7 7 8	79	8 8	80	80	11	7.8	
mum mum	::	828	81 7	97 97		80 79		79 79 79 79		79 79 87 97		71 87 77		77 77 67 67 67 61 61 61	===	- 12	7.8	79	7.8	77	82	9 82	83	9 82	80	1 80	79	79	79	73	19	79	0.0
-	::	8008	81 8	81 81 81 81		81 81		81 82		83 81		80 80		97 97	77	7 7 6	76	75	7.5	77 +	75	3 75	75	5 75	75	75	75	75	75	74	75	7.7	8 ~
September Maximum. Minimum.	7	75 74		74 74		74 74		74 73		73 73		74 74 73 74		74 73		72 72 77	72	72 2		72 72 72 72	72	2 72 2 72	72	12 2 7 1 7 0	0.69	69	69	69	68	66	11	72	~ ~

### WABASH RIVER BASIN--Continued

3-3485. WHITE RIVER NEAR NOBLESVILLE, IND.

LOCATION.--Temperature recorder at gaging station on highway bridge, 1 mile west of Strawtown, 7 miles northeast of Noblesville, Ramitor County, and 9.5 miles upstream from Cacero Creek, and at mile 277.4.

BRAINAGE AREA.--814 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1963 to July 1967, October 1962 to September 1963.

EXTREMES, 1962-63.--Water temperatures: Maximum, 82°F June 9, 10, July 2, 3, 18-20, 27, 29; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

	Aver-	28 29 30 31 age	50 50 50 60 60 649 46 58	1 42 42 46 9 40 42 45	2 32 32 33 35 2 32 32 35	2 32 32 32 2 32 22 32 32	325	9 52 55 55 41 7 49 52 52 40	62 62 61 56 57 01 53 52	65 67 66 67 62	79 80 81 77 78 76 78 73	81 82 80 80 79 78 78 76 76 75	72 72 74 73 75 70 70 71 70 72	65 64 61 71
		2.2	46 50	41 41 41 41 39	33 32	32 32 32 32	32 32 32 32	48 49	55	68	80	82	72	65
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ruermograpu)		19 20	62 59 60	46 45 45	32 33 32 32	32 32	32 32 32 32	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	95 09	67 68 64 64	76 76 73 73	82 82 80 74	69 70 68 68	74 73
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arconor-actuated	Day	91 91	68 68 67 66	47 48	33 32	33 33	32 32	41 41 40 41	54 54	67 65 63 61	74 75 72 71	76 78	72 72 68 69	73 75
- 1		13 14	68 67 66 66	4 4 6 4 6 5 6 4 6 5 6 6 5 6 6 5 6 6 6 6	34 34	35 33	32 32	41 41 40 40	52 53	63 67 58 61	73 76	78 74	77 74	75 72
s erus r		12	6.5	7.4 7.4	4 4	36	32	38	£ 4 8	5.9	79	78	78	77
Snont Tinon's		01	63 65 61 63	48 48 47	35 34 34	36 36	32 32 32 32	38 38 38 38	54 52 50 48	72 70 69 65	82 80 80 77	75 77	78 78 74 75	77 77
TOO)		6	63 62	47 48	37 36 36 35	34 34 34	32 32 32 32	36 38	54 55	69 72	81 82 77 79	76 76 72 72	78 78 74 76	74 76
		2 9	63	47	37	66	32	8 8	50.8	66	79	74	7 8	7.2
		2 6	62 62 61 61	44 46 46	42 45 40	32 33	32 32 32 32	33 33	51 51 49	63 64 63 61	74 74 73 73	77 76 72 73	80 77 76 75	71 72
		3 4	62 62 59 61	47 47	43 42	32 32 32 32	32 32	33 33 32 33	54 53	61 64 55 59	74 74 72 73	82 79	80 80 76 77	72 72
		1 2	60 58 59	47 47 46 46	42 43	33 32	32 32 32 32	32 32 32 32	52 54 49 50	53 56 51 52	73 74 68 71	81 82 78 78	80 78 76 75	72 72
	;	Month	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum	Maximum	April Maximum Minimum	Maximum	June Maximum Minimum	July Maximum Minimum	August Maximum	September

### WABASH RIVER BASIN--Continued

3-3490. WHITE RIVER AT NOBLESVILLE, IND.

LOCATION ... "Pemperature recorder at gaging station at Logan Street Bridge in Noblesville, Hamilton County, 1.5 miles upstream DRAIMOG AREA. and 3.5 miles below dam at Clare.
DRAIMOG AREA. -837 square miles.
RECORDS ANAILABLE. - water temperatures: November 1952 to September 1963.
RETRIBES, 1962-63. --water temperatures: Maximum, 86 F July 2; minimum, freezing point on many days during December to March.
REMRINGE, 1962-63. --water temperatures: Maximum, 94 F Aug. 1, 1993; minimum freezing point on many days during winter months REMARKS. --Plow regulated by powerplant above station.

November 1952 to September 1963. Haximum, 85°F July 2; minimum, Heczing point on many days during December to March, Haximum, 94°F Aug. 1, 1953, minimum freezing point on many days during whiter months.

Aver-	age	57	427	; ;	33	33	704	55	66	77	97	76 71	7.7
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	29	0.4	4 5 6 7	32	32	11	53	61	6.5	81	82	73	63
	88	24	4 4	32	32	36	50	58	69	83	81	73	65
	27	4 4 6 4	42	32	32	36	4 4 6 0	560	70	83 76	79	73	69
	92	7 J	4 4	32	32	36	4 4 20 00	53	71	81	82	73	69
	25	50	4 4	32	32	35	8 4	€. 4 €. 0	68	80	81	75	63
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	23	0.4 0.4	44	32	32	33	39	56	59	75	7.7	75	70
	22	59	4.5	32	32	33	39	20	65	74	75	44	75
70	21	59	4 4 6	32	32	34	39	61	6.8	44	75	73	75
cuermograph)	20	29	4 6	33	32	35	44	61	70	76	7.5	71	76
	19	59	4 4 6	34	32	35	7 7 7 7	61	70	77	7.8	70	76
Day	18	61	6 4 9	33	32	333	r 4 4	299	67	76	83	70	75
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Day	91	70	4 4	1 }	333	33	41	5.5	61	75	7.9	7.5	71
	15	70	47	11	333	8 8	39	57	64	73	78	73	71
	14	68	42		33	333	41	55	66	47	76	74	71
	13	69	4 4	1 1	3.4	33	4 0 4	52	58	72	78	79	74
9	12	668	47	1.1	3.5	33	40	55	60	75	79	78	75
	Ξ	66	4 4 8 0	1	W W 50 W	333	38	54	6.4	78	77	78	75
	10	409	6 4 8 4 8	35	335	33	38	54	72	81	75	90	75
	6	64	4 4 6 4	35	8 8	333	38	0 4 4	72	83	77	83	75
	8	653	4 5	38	333	34	36	5.5	6.2	81	77	83	73
	7	63	4 6	3.8	33	33	33	54	66	78	76	81	1,1
	9	62	9 4 4	4 4 7 7 7 7	32	9.9	33	55	49	74	77	79	71
	2	62	45	4 4 0	32	333	32	52	63	74	78	81	72
	4	59	47	4 4 5	32	333	36	54	59	75	78	83	72
	3	59	47	4 4	32	33	36	55	5.9	75	81	83	72
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	1	900	47	4 4	32	33	33	50	50	73	83	82	73
		11	11	11		i i	11	- ; ;	1	- 1 1	::	11	1 1
Month	Month	October Maximum Minimum November	Maximum Minimum December	Maximum	January Maximum Minimum	EΕ	mnm	April Maximum Minimum	kımum ılmum	Maximum Minimum		Maximum Minimum	September Maximum Minimum

### WABASH RIVER BASIN .- Continued

3-3510. WHITE RIVER NEAR NORA, IND.

DOMATOW.-Temperature recorder at gaging station on bridge on State Highway 100, 2 miles east of Nora, Marion County, and 14 miles DAMINGE AREA.—1,200 square miles.

BROONS AVAILABLE.— water temperatures: June 1954 to May 1960, October 1962 to September 1963.

BRINEMES. 1962-63.—"Water temperatures: Maximum, 80°F July 19-21; minimum, free\*Zing point on many days during December to March.

EXTREMES. 1962-60, 1962-63.—"Water temperatures: Maximum, 88°F July 14, 1954; minimum, free\*Zing point on many days during winter months.

REMARKS. -- Flow regulated by powerplant above station.

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2 9	7	_	6	2	=	21	13	4	15 16	-1	<b>œ</b>	62	20	22	22	23	24	22	56	27 2	28 29	8	8	age
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45 45 4			4 2 4	45 46	47	47	47 47	48 4	48 48	4 4	4 4	4 6	4 4 6 4	4 to 4	46	46	6 4 3	45 4	75	42 42 41 42		44 45 43 43	11	4 t
42 41 38 3			36	36 35	8 8	33	32 3	32 3	32 32 32 32	32	32	32	32	32	32	32	32	32	32	32 32 32 32		32 32 32 32	32	3.8
32 32 32 32 32 32				32 32	32	32	32 3	32 3	32 32	32	32	32	32	32	32	32	32	32 3	32	32 3	32 3	32 32 32 32	32	32
33 33 33		m m	w w	33 33	33	33	33 3	33	33 33	33	33	33	6 E	33	33	33	333	88	333	333	333	11	11	333
33 33 34 33 33 33		4.0	40	35 35	35	35	37 3	37 3	37 39 37 37	39	4.1	43	42	43	39	41	43	4 6 4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	9 9	4 4 9 4	4 6 5	50 52	52	39
50 52 53 50 50 52	· · ·	m 24	20	54 54	52	53	53	53	52 54	54	5.8	5.88	59	60	5.50	50.50	20.60	4.6	5.6	5.5	60 6	61 61		2,4
62 64 65 60 62 64		w 4	99	69 69	6.5	65	61 6	63 6	63 62 62 61	63	62	65	99	99	65	63	63	63	65	68 6	68 6	68 67 67 66	65	69 63
71 72 74 70 70 72		3.5	7	77 77	76	74	71 7	70 7	70 70	71	710	71	17	71	70	70	70	72	72	73 7	7 47	74 74 72 72		72
74 73 74		4 0		75 74	74	74	75 7	747	76 77	7.8	77	78	80	80	77	77	7.8	78	78	78 7	7 8 7	78 78 78 78	1.8	77 8
78 78 78 77 77	7.8	9 1-		78 78 78 78	7.8	7.8	77 77	76 7	74 74	7.3	73	72	7.1	73	74 73	74	75	75	74	74 7	74 7	74 73	73	3 75
70 69 70 69 69 69	69	0		72 72	7.1	7.1	71	9 69	69 89	69	69	69	69	69	68	67	99	79	63	63 63	_	63 63	-	- 68

WABASH RIVER BASIN -- Continued

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

LOCATION. --Temperature recorder at gaging station, 1,700 feet downstream from highway bridge, 1 mile north of Seymour, Jackson County, 9,6 miles downstream from Sand Creek, and at mile 219.2.

FROMINGE AREA. --2, 333 square miles.

RECORDS AVAILABLE. -- Wafer temperatures: orchoor 1954 to September 1963.

EXTREMES, 1962-63. -- Wafer temperature: Maximum, 82°F 191y 18, 19, Aug. 3-5; minimum, freezing point Peb, 6-18, Peb, 23 to Mar. 2.

EXTREMES, 1964-63. -- Wafer temperature: Maximum, 84°F Aug. 2-7, 1955; minimum, freezing point on many days during winter months. REMARS. -- Regulation at low flow by pumping plant 1,200 feet upstream from recorder.

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

2 4 5 6 7
64 65 64 63 64 65 65 66 67 62 64 63 62 64 65 65 65 65
70
44 44 43 44 43 38 37 36 34 33 33 33 43 43 43 43 43 37 36 34 33 33 33
33 33 34 35 35 35 35 36 39 40 39 33 33 33 34 35 35 35 35 36 39 37
33 33 33 33 33 32 32 32 32 32 32 32 32 3
34 35 34 34 34 34 36 36 38 39 4 <u>1</u> 32 33 33 33 34 33 34 36 36 38 39
57 58 58 54 52 52 53 54 53 53 54 54 55 54 55 54 55 54 55 54 55 54 55 55
55 58 61 64 64 65 66 69 69 68 64 60 52 54 56 60 61 62 63 65 67 64 60
71 70 69 69 74 76 76 79 79 79 78 76 76 79 69 69 67 69 72 74 75 77 76 76 73
80 79 79 77 77 75 75 75 75 76 76 77 77 97 97 97 97 97 97 97 97 97 97 97
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75 74 73 73 73 74 75 76 76 75 76 75 76 75 75 75 75 75 75 75 75 75 75 75 75 75

98 20

6.5

190 274 a264

641 529 791 635

82 68 18 90

284 245 339 302

386 320 491 386

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79 67 115 79

246 216 269 269 258

2 (minimum)... Nov. 17 (maximum)...

12

ama m Oct. (maximum)... Dec. 1 (minimum).... Jan. 2, 1963 (maxi-

Dec. 27

Oct. 21, 1962 (maxi-

788 782

345 292

503 462

5.7

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119 89

34 118 28 28 28 30 30 35

### WABASH RIVER BASIN -- Continued

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

LOCATION .--At bridge connecting Illinois State Highway 141 and Indiana State Highway 762, 5.2 miles northeast of New Haven, Gallatin County, 2.1 miles upstream from Mackeys Ferry, and 9.2 miles upstream from Little Wabash River.

DRAINAGE AREA. -- 29,500 square miles, approximately.

And A MAILABLE .—Chantcal Manalyses "Professionaria" (1961, October 1962 to June 1963 (discontinued), Water temperatures "October 1964, October 1962 to June 1963 (discontinued), Water temperatures "October 1965 of December 1961, October 1962 to June 1963 (discontinued), Branches 1962 to June 1963 (discontinued), Branches 1962 to June 1963 (Maximum, 148 ppm Mar. 1-31.

Ratchess (Maximum, 316 ppm Dec. 1-31, Maximum, 148 ppm Mar. 1-31.

Ratchess (Maximum, 647 Mar. 1969 ) And Andromoto Mar. 186 ppm Dec. 1-31, Maximum, 148 ppm Mar. 1-31.

Ratchess (Maximum, 647 Mar. 1969 ) Andromoto Mar. 196 ppm Dec. 1-31, 1957.

Ratchess (Maximum, 647 Mar. 1969 ) Andromoto Mar. 1-34, 1661; Maximum, 176 ppm Dec. 21-31, 1957.

Ratchess (Maximum, 331 ppm Mar. 1-34, 1661; Maximum, 1690 ppm Mar. 1-34, 1661; Maximum, 1480 ppm Mar. 1-34, 1661; Maximum, 1480 ppm Mar. 1-34, 1661; Maximum, 1480 ppm Mar. 1-34, 1661; Maximum, 1481 ppm Mar. 1-34, 1661; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 22, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Mar. 24, 1861; Maximum, 1481 ppm Maximum, 1481 ppm Maximum, 1481 ppm Maximum, 1481 ppm Maximum, 1481 ppm Maximum, 1481 ppm Maximum, 1481 p

No discharge records available.

		Color								_					
		Ħ													
	Specific conduct-	(micro- mhos at 25°C)	590	672	989	645	665	0	200	483	529	526		564	
		Non- carbon- ate		92							84			75	
	Hardness as CaCO,	Calcium, magne-		310							265			259	
	Dissolved			416			428	0	977	298	298	304		344	
63	Z.	trate (NO <sub>3</sub> )		4.2		-	7.9				0.9			5.7	
June 18	Fluo-	ride (F)	0.1	2		ς.	ς.		-	•	₹.	4.		0.2	tance
Chemical analyses, in parts per million, October 1962 to June 1963	Chlorido	(CI)	24	34	35	40	42	,	97	18	50	22		27	Analyses based on monthly extremes of specific conductance
, October	Gulfato	(30,	74	06	83	84	83	,	43	29	29	70		70	of specif
million	Bicar-	bonate (HCO <sub>3</sub> )	240	265	284	234	254	,	621	198	220	220		225	tremes
s per	Po-	Sium (K)						_							hly ex
, in part	ani pro	(Na)													d on mont
analyses	Мад-	sium (Mg)													ses pase
mical	Cal-	cium (Ca)													Analy
Che	1	(Fe)													
	041100	(SiO <sub>2</sub> )		_					_						
	Mean	discharge (cfs)													
		Date of collection	Oct. 11-31, 1962	Nov. 1-4, 8-30	Dec. 1-31	Jan. 1-25, 1963	Feb. 11-28		Mar. 1-31	Apr. 1-30	May 1-31	June 1-23	Time-weighted	average	

	(003).
	carbonate
(mnm)	udd 9
mum)Jan. 11 (min)	a Includes

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

Cal- Mag- Cal- Ng Ag- Ag- Ag- Ag- Ag- Ag- Ag- Ag- Ag- Ag	Cal- Mag- Sodium tas- Sodium tas- Bulfate (Cal) (Cal) (Cal) (Mg) (Mg) (Mg) (Mg) (Mg) (Mg) (Mg) (Mg		5	emica1	analyse	s, tn pa	rts per	#11140	n, Octo	er 1962	Chemical analyses, in parts per million, October 1962 to June 1963Continued	93Çō	tinue	-	Trans.		Garaitie		
Claim   Sium   Chaim   Sium   Chaim	Claim   Sium   Chaim   Sium   Chaim	St) tes			Cal-	Mag-	Sodium	Po-	Bicar-	Gulfate	Chloride	Fluo-	ź	Dissolved	as Ca	- 1	specific conduct-		
92 44 0.1 8.6 453 312 92 72 88 88 42 .1 8.6 93 81 82 84 851 82 84 851 82 84 851 82 84 851 82 84 851 82 85 84 851 82 85 84 851 82 85 84 851 85 85 85 85 85 85 85 85 85 85 85 85 85	92 44 0.1 8.6 453 312 92 72 88 88 42 .1 8.5 381 282 74 669 74 8.1 3.9 144 8 251 75 55 74 8.5 312 8.5 55 75 88 8 8 8 1.2	discharge (SiO <sub>2</sub> ) (Fe)			ctum (Ca)	sium (Mg)	(Na)	Stum (K)	bonate (HCO <sub>3</sub> )	(so*)	(CI)	ride (F)	trate (NO <sub>s</sub> )	(residue at 180°C)	Calcium, magne -	Non- carbon- ate	mhos at 25°C)	푅	Color
77	77								050	90	,,	,		700		0	002		
88 42 42 4.0 420 298 84 671 8 4.0 1 420 298 84 671 8 6	88 42 47 40 420 298 84 671 298 84 671 298 84 671 29 8 84 671 29 8 84 671 25 8 84 85 25 8 84 671 25 8 84 85 25 8 84 85 84		_						P220	26	4 0	-		381	212	74	609		
24         18         .1         3.9         144         83         28         215           70         29         .0         5.5         240         251         74         383           67         18         .3         6.6         284         175         54         383           67         18         .4         4.1         250         284         694         383           7         18         .4         4.1         250         190         56         93           7         28         .4         7.2         296         208         82         578           57         18         .4         7.2         296         208         62         455	24 18 1.1 3.9 144 833 28 2.15 4.8 15 0.0 5.5 246 175 74 383 6.7 18 1.3 6.6 3.46 175 54 383 5.3 18 1.4 4.1 250 190 6.5 6.4 383 7.6 2.8 4.1 250 2.8 82 5.78 5.7 18 7.2 2.96 2.09 62 4.55	_							c244	88	42	4		420	298	84	671		
70	70								89	24	18	٦.		144	83	28	215		
48 15 .0 6.6 246 175 54 383 67 18 .3 6.6 50 284 69 584 53 18 .4 4.1 250 284 69 56 76 28 .4 7.2 296 209 62 578 57 18 .4 7.2 296 209 62 455	48 15 .0 6.6 246 175 84 383 67 18 .3 6.6 55 250 190 56 435 57 18 .4 7.2 296 209 62 455								d206	70	53	0.	5.5	340	251	74	550		
67 18 .3 6.6 350 284 69 564 76 28 .4 4.1 250 190 69 578 76 28 .4 7.2 296 209 62 455	67 18 .3 6.6 350 284 69 584 76 28 .4 7.2 296 209 62 455								148	48	15	۰.	9.9	246	175	54	383		
53 18 .4 4.1 250 190 56 455 57 18 .4 7.2 356 296 82 678 57 18 .4 7.2 396 209 62 456	53 18 .4 4.1 250 190 56 455 76 28 .4 7.2 296 209 62 455 57 18 .4 7.2 296 209 62 455								262	29	18	e.	9.9	320	284	69	584		
76 28 .4 3.2 355 278 82 578 57 18 .4 7.2 296 209 62 455	76 28 .4 3.2 355 278 82 578 578 578 355 209 62 455								164	23	18	4.	4.1	250	190	26	435		
57 18 .4 7.2 296 209 62 455	57 18 .4 7.2 296 209 62 455								238	92	28	4	3.2	355	278	82	578		
									180	57	18	4.	7.2	296	209	62	455		

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

	Aver-	age	38	1   4	68
		31	54 	112	121
		30	56 48 35	1   8	921
		59	56 46 35	1   5	62 70
		28	55 47 35	36	68
		27	55 46 35	36	68
		26	54 47 35	35	68
		25	56 47 36	1 8 8	68
		24	59 46 35	36	89
		23	64 46 35	1 48 8	68 68 76
Temperature (°F) of water, October 1962 to June 1963 (Once-daily measurement at approximately 0830)		22	63 46 36	188	68 68 76
(0830)		12	65 48 38	1 2 4	68 68 76
, Ju		20	67 48 37	37	64 68 76
2 tc		19	68 49 36	188	63
196 mtx		18	67 49 35	1.88	62 68 78
ber		17	68 50 35	188	61 68 78
October 1962 to J at approximately	Day	91	69 50 34	1 46	60 70 78
ı,		15	71 51 34	1 4 5	59 70 78
perature (°F) of water, (Once-dally measurement		14	70 50 33	14.5	58 82 83
of w		13	70 70 32 32 3	1 4 5	57 8 82 82 82
(F)		12	70 50 32	188	57 70 80
e ('a11)		11	32 25	184	82 28
ttur e-d		10	52 35	114	58 71 84
pera (Onc		6	388	118	71 84
Tem		8	50	116	59 70 83
		7	515	118	838
		9	52	17	57 66 80
		2	53 5	4	55 64 80 80
		4	148	115	59 78
		3	533	1   5	59 5 62 6 78 7
		7	53	37	59 60 76
		~	148	37 1	58 5 60 6 72 7
	Month	Month	October November December	January February	April May

9

### TRADEWATER RIVER BASIN

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

LOCATION, --At gaging station at highway bridge at Olney, Hopkins County, 1.1 miles upstream from Cave Creek, 5.1 miles downstream from Flynn Creek, and 9.5 miles northeast of Princeton.

PREVAILED STATES

Col-5.7 9.9 6.0 6.4 7.1 5.7 5.5 푱. Acid-conduct-550 503 501 407 398 231 375 383 259 394 247 372 (micromhos at ance cium, carbon-(H<sup>1</sup>1) 0.4 259 ate Hardness as CaCO, magne-Cal-259 sium Dissolved at 180°C) (residue 403 368 373 278 274 156 250 262 165 183 145 250 solids 215 Chemical analyses, in parts per million, water year October 1962 to September 1963 trate ż NO. Fluo-Chloride <u>S</u> Sulfate (so 273 bonate Bicar-(HCO,) Po-tas-sium (K) Sodium (Na) Mag-nesium (Mg) clum (Ca) Cal-Manga-nese (Mn) 1.4 0.01 Iron (Fe) Alum-3,0 inum (SiO<sub>2</sub>) Silica 7 106 106 35.0 42.4 14.7 discharge ł Mean 901 109 109 117 109 1123 (cts) a165 Nov. 1-30,... 1963... 7-28.... July 1-31.... Oct. 1-31,1962 Dec. 1-31.... Mar. 1-31.... Apr. 1-30.... June 1-30.... Aug. 1-31.... average.... Time-weighted average.... 1-9, 13collection Weighted Jan. Feb.

days; mean discharge for 348 days of chemical analyses, 169 cfs. a Mean discharge based on 365

1

Tons per day.

ŀ

1

98

(Analyses hased on maximum and minimum monthly specific conductance, and maximum monthly turbidity	Chemical an	Chem.cal analyses, in parts per million, water year October 1962 to September 1963 is based on maximum and minimum monthly specific conductance, and maximum monthly Ha	# 6 ⊢	alys	ses, in pa	rts per	monthly	on, water specifi	year Octo	ober 19	62 to S	September	1963 hly turi Hard	turbidity) Hardness		Specific			
Mean		Alum-		Man-		Po-	Bicar			100	ź	Dissolved	as CaCO,	°0,	Acid-C	Specific Acid-conduct-			å
scharg (cfs)	discharge (SiO <sub>2</sub> )		Tron (Fe)	ga- nese (Mn)	Sodium (Na)	tas- sium (K)	bonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (C1)	ride (F)	- 5	solids (residue at 180°C)	Cal- cium, magne- sium	Non- carbon- ate	1ty (H <sup>†</sup> 1)	(H <sup>+</sup> 1) (micro- mhos at 25°C)	Hd.	Col- or	Tur- bid- ity
49	15	13	0.11	1 14			0	573	7.5			840	408	408	2.2	1050	3.6	9	!
111	6.3	3.	2 .00	.00			18	158	3.4			255	174	159	1	377	7.1	œ	1
314		- - -	-	-			1	1	1			-	1	I	1	1	ŀ	1	15
203	13	8.2	.20	0 11			4	452	4.0			680	404	401	1.2	836	4.7	23	}
74	8.0	0	1 .02	2 7.0			15	203	2.0			322	210	198	0.	453	6.1	10	1
211	<u> </u>	 	-				!	}	!			1	1	1	1	1	1	1	2
108	12	6.3	.48	8 11			0	461	3.0			750	419	419	1.4	869	4.3	6	1
568	6.7	7	- 0.01	1.09			22	94	4.0			196	107	68	1	260	7.2	4	1
568				-			1	1	1			1	1	1	1	ŀ	1	1	280
63	8.2	2.	1 .03	3 4.4			11	199	4.0			313	202	193	1	450	6.5	8	}
424	7.7	7	1 .33	3 2.5			7	119	4.0			200	121	116	1	294	6.5	0	1
181	-		-	1			1	1	1			1	i	1	1	1	į	1	15
7.1	7.6		10.01	1 4.9			12	195	5.0			310	200	190	1	445	6.7	73	1
139	7.3		.01	1 3.0			16	130	4.0			214	136	123	1	330	6.7	0	1
226		; 	-	-	_		1	1	1			-	-	1	1	1	-	1	15
199	6.5		.3	3 8.6			17	191	8.0			303	193	179	1	433	6.9	10	!
2070	5.1	1 .2	2 .12	2 1.4	-		16	30	3.0			84	38	25	1	114	7.0	20	1
1660		 		-			1	ł	-			1	1	1	1	1	1	Ī	200

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

Tur-bid-ity i 1 10 1 30 ł 10 ł 1 15 ł 1 35 ŀ ŀ 15 1 3 2 10 2 10 10 S 10 D or c 6.5 7.0 6.5 7.2 5.1 8.9 7.1 ł i 6,1 ł ŀ 6.7 ł 9.9 6.7 ; Ħ Specific conduct ance (micro-mhos at 25°C) 206 681 294 787 167 290 ī 187 Non- 1ty carbon- (H<sup>+</sup>1) 0.1 cid-0 1 7 0. 1 0 ٥. 0. 0. 0 0 0. 0 ŀ ŀ ŀ 240 114 78 393 172 46 26 64 i 222 \$ ļ 87 ţ 24 ļ ate Hardness as CaCO, Chemical analyses, in parts per million, water year October 1962 to September 1963--Continued Calmagne -253 396 88 78 188 8 136 127 1 1 ŀ 1 8 ļ 131 104 ļ solids (residue at 180°C) 188 280 138 190 140 136 Dissolved 354 ł 960 124 ŀ 284 ļ 190 90 ŀ Ni-trate (NO<sub>4</sub>) Fluo-ride 2.0 4.0 2,0 3.0 2.0 3.0 6.0 3.0 2.0 4.0 3.5 Chloride (Cl) 1 1 ļ į ļ ł Sulfate (SO<sub>4</sub>) 238 ŀ 397 65 ł 224 37 170 47 87 34 - 1 88 31 ! Bicar-bonate (HCO,) 16 16 30 46 8 48 20 ! 1 9 ! 64 86 ŀ Po-tas-sium (K) Sodium (Na) Man-ga-nese (Mn) 8 ł .03 8 8 8 8 ł ! ł 8 02 8 l 9.5 0.00 8 8 ļ 8 ţ 8 ļ 8 8 21 13 8 8 ١ fron (Fe) Alum-inum (Al) 0.7 1,2 0 1,8 ٥. 1 1 ٦. 1 ! ٦. ۲. 1 ŀ 0 ŀ Silica (SiO<sub>2</sub>) 7.8 6.7 9.7 9.7 8.2 4.4 4.8 4.5 ŀ 12 2.2 Mean discharge (cfs) ļ 6.6 258 18 12 22 27 64 193 22 38 **4**3 38 27 193 31 44 Sept. 3 (maximum conductance)... Sept. 30 (mini-mum conductance) Sept. 4 (maximum turbidity).... ductance).....
Apr. 1 (minimum conductance)...
Apr. 25 (maximum turbidity).... May 31 (maximum conductance)...
May 14 (minimum conductance)...
May 14 (maximum turbidity).... conductance)...
June 22 (minimum
conductance)... July 8 (maximum conductance)...
July 18 (minimum conductance)...
July 4 (maximum turbidity).... Aug. 28 (maximum conductance)...
Aug. 12 (minimum conductance)...
Aug. 2 (maximum turbidity).... June 10 (maximum turbidity).... June 1 (maximum Date of collection (maximum con-

TRADEWATER RIVER BASIN--Continued

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

														-	Day															Aver-	ļ.
Month	-	7	6	4	2	9	2	6	01 6	=	21	13	4	12	92	17	82	61	20 2	21 2	22 2	23	24 2	25 2	26 2	27 28	3 29	30	<u>8</u>	age	e.
October																															
а.п.	59	6.1	62	62	62	63 6	63	9 59	94 94	9	99	67	99	89	69	67	9.4	62 6	- 79	9 49	61	50	55	545	51	50		53 55	5,5	19	
p.mNovember	0.9			25								9 9	69	69	0.2		6.5														
а.п	:		200	0,4	4 8 4			46 4	47 47			47	47	8 7	64	200	64	47		47 4	47 6	454	4.5	4 9 4	7 7 7 7	43.4	43 6	77 77	-		~
p.m		52		20	5 4				8 4 8 4		4 8	¢ 8	80	64	20		8 4	47		8 7	8 4	4 9 4	4 9 4	4 9 4	4 9 4	77 77 77		46 47		8 7	~
a.m	4.5			4.2			37 3.	37 3	36 33	33	3.2	3.2	3.2	3.2	3.2	3.2	32	32	36	333	37		32	32 3	34	32 3.	32 3	33 33	33	35	
р.ш.с.	4 7	4 6	4.5	4	7 7 7	<u>-</u>						32	32		32		32					38			_		_				
January a.m	33	6, 6	6.4	5 6	35	36	36	36	37 40	4.2	4 4	36	32	3.2	32	32	8 8	33	32	32 3	32	25.00	3.5	32.3	32	32 32		22 32	32	4 4	
February				32								3 2	33		32		32														+ -
p.m	32	3.2	32	32		34	34	34 3	33 33		35	33	33	32	3.2		34		37	35.3	3.2	32	34		3.2			1		33	
а.ш	36	35				4 6 4						6.4	50		6 4		51	5.										55 58			m
р.ш.с	38	38	0,4	6.5	9 7		47 47	47	47 47	4 9	64	90	20	64	20	53	2.5		51	700	8 7	44	51	9 93	25	51 54		58	3	2,4	2
April a.m	59	6.1	63	19	80 0	95	52	57 5	58 57	5.	.c.	5.5	4:	4.	52	80	29	7,9	693	4:	99	999		- 20	5.6	600 5	69	09 09	1	57	<b>.</b>
Mary a.m.	55			20											, X		6 6														
p.m.c.	57	56	28	19	63 6	65	66 68		69 70		67	67	29	69	20	2	7.1	69	89	68		9	19		61	99 +9		68 67	8	99	
a d	69	70	717	70	71 73	72 7	73 7	75 7	76 78 79 80	77	76	74	74	<b>*</b> * * * * * * * * * * * * * * * * * *	72	73	70	7.07	72	70 6	72	7 47	71 7	72 7	72 7	73 74		77 77	11	72 74	DI +
July a.m. p.m.	7.6	76	76	76	75 77	76 77	7 8 7	7 57 77	74 72 76 74	7.1	70	71	72	73	74	7.8	77	808	90	78 7	77	77 7 7 7 7 8 7	7.6	76 7	76 77	7 8 7	7.6	76 76 77 78	75	7.5	.0 5
August a.m p.m.	76 78	76	808	7.8	80 8	80 8	79 7	78 7	77 77	76	76	76	74	71	70	70	70	70 7	71	68 6	69	70 7	020	72 7	72 7	71 7	71 7	72 71	77	73	70.10
September a.m p.m	69	70	71	71	71 6	69 6	7 1 7	68 6	69 69 70 70	70	21	69	58 68	69	68	70	7.0	67 6	99	67 68 6	65	6 4 6	63	62 6	63	64 64 64 64		62 59	11	68	~ m

### QUALITY OF SURFACE WATERS, 1963

### TRADEWATER RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963

ļ.		OCTOBE			NOVEMBE			DECEMBER		
		Suspen	ded sediment		Suspen	ded sediment		Suspen	ded	sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	-	Tons per day
1	48	3	0.4	77	1	0.2	70	2	1	0.4
2	114	3	.9	68	1	• 2	68	. 2		• 4
3	195	3	1.6	62	1	• 2	67	2		•
4	151	3	1 • 2	70	1	• 2	67	2		•
5	49	2	•3	95	1	• 2	66	2		•
6	116	2	•6	81	1	• 2	6.5	2		
7	47	2	•2	74	l i	• 2	65	2		:
8	42	1	•1	74	î	.2	61	1 2		
9	60	i	•2	73	2	.4	6.5	2	1	
10	60	1	•2	81	. 2	•4	64	2		
		1 _	` <u>.</u>	97	2		60	2	į.	
11	64	2	• 3			. • 5			1	:
12	66	1 1	• 2	137	3	1.1	•56	2	3	
13	246	144	S 123	211	9	5 • 1 F 7	55 54		ì	•
14	356 314	27	E 230	242 203		E 7 E 3	1 53	2 2	1	:
19	314		: 23 [	203	_		1		İ	•
16	122	17	5.6	157		E 2	. 53	2		
17 i	167		E B	131		E 1	53	, 2	J	
18	106		'Ē 5	186		E 2	. 54	2		
19	68		,E 3	143	2	•8	56	2		•
20	95		'E 5	126	3	1.0	60	3		•
21	128		E 6	124	3	1.0	67	3		
22	85		E 4	114	2	•6	102	1 4		1.
23	35		E 2	107	2	•6	152	16		4.
24	111	18	5.4	91	2	• 5	138			1.
25	41	14	1.6	79	2	.4	108	5 2		
		1	1							
26	36	5	•5	74	2	• 4	89	4		1 •
27	58	4	•6	74	2	.4	78	4		. •
28	71	3	•6	72 71	2 2	• 4	73 158	8 3 U	; 5	1. 16
29	73	1	•2			• 4		121	5	
30	74 75	1 1	•2	76	2	• 4	568 623	38	1	165 64
			-		-		+	+		
Fotal	3273		430.1	3264		31.0	3368			263•
į		JANUAR	Y		FEBRUAR	Y	ļ	MARCH		
1	424	10	11	56	8	1.2	199		E	17
2	247	7	4.7	62	8	1.3		175		332
3	181	6	2.9	<b>7</b> 0	9	1.7	779	142		299
4	156	5	2 • 1	108	9	2 • 6	597	32		52
5	134	5	1.8	151	9	3.6	1660	414	5	1770
6	128	5	1.7	137	9	3.3	2070	237		1320
7	126		1.4	126	9	3.1	2100	166		941
8	126	4	1.3	126	10	3.4	2310	137		854
9	114	4	1.2	114	1 11	3.4	2430	68		446
10	104	5	1.4	104	11	3.1	2040	2.9	1	160
i			l i		i					
11	97	4	1.0	143	12	4 • 6	1600	36	,	156
12	90	4	1.0	220	18	11	1520	108		443
13	82	3	.7	226	21	13	1400	141		533
	73	2	•4	181	8	3.9	1310	67	,	237
14		4	•8	139	3	1.1	1010	, 28		76
15	70	1	1				834	35		79
15				101	. 3				: -	745
15	66	5 5	•9	101 84	3 2	.8		246		
16	66 64	5	.9	84	, 2	.4	1040	246 65	15	195
16	66	5 5		84 78	2	•4	1040 1110	0.0		195 191
16 17 18	66 64 62	5	•9 •8	84	, 2	.4	1040 1110 1160	246 65 61 49		195 191 146
16 17 18 19 20	66 64 62 60 58	5 5 6	•9 •8 •8 •9	84 78 77 77	1 1 1	•4 •2 •2 •2	1040 1110 1160 1100	61		191 146
16 17 18 19 20	66 64 62 60 58	5 5 5 6	.9 .8 .8 .9	84 78 77 77	1 1 1	•4 •2 •2 •2	1040 1110 1160 1100	61 49		191 146 80
15 16 17 18 19 20	66 64 62 60 58 57	5 5 6 7 8	.9 .8 .8 .9	84 78 77 77 78 73	1 1 1 1	•4 •2 •2 •2 •2	1040 1110 1160 1100 867 541	61		191 146 80 28
15 16 17 18 19 20 21 22 23	66 64 62 60 58 57 56 54	5 5 6 7 8 8	.9 .8 .8 .9 1.1 1.2	84 78 77 77 78 73 70		.4 .2 .2 .2 .2	1040 1110 1160 1100 867 541 354	34 19		191 146 80 28 8.
15 16 17 18 19 20 21 22 23 24	66 64 62 60 58 57	5 5 6 7 8	.9 .8 .8 .9	84 78 77 77 78 73	1 1 1 1	•4 •2 •2 •2 •2	1040 1110 1160 1100 867 541 354 241	61 49 34 19		191 146 80 28 8. 3.
15 16 17 18 19 20 21 22 23 24 25	66 64 62 60 58 57 56 54 54	5 5 5 6 7 8 8 8	.9 .8 .8 .9 1.1 1.2 1.2 1.2	84 78 77 77 78 73 70 71		.4 .2 .2 .2 .2 .2 .2 .2 .2	1040 1110 1160 1100 867 541 354 241 218	34 19 9 6 8	 	191 146 80 28 8. 3.
15 16 17 18 19 20 21 22 23 25 26	66 64 62 60 58 57 56 54 52	5556 78888888888888888888888888888888888	.9 .8 .8 .9 1.1 1.2 1.2 1.2 1.1	84 78 77 77 78 73 70 71 71		.4 .2 .2 .2 .2 .2 .2 .2 .2	1040 1110 1160 1100 867 541 354 241 218	34 19 9 6 8	5	191 146 80 28 8. 3. 4.
15 16 17 18 19 20 21 22 23 24 25 26 27	66 64 62 60 58 57 56 54 54 52	5556 78888 88888	.9 .8 .8 .9 1.1 1.2 1.2 1.2 1.1	84 78 77 77 78 73 70 71 71 78		.4 .2 .2 .2 .2 .2 .2 .2 .2 .2	1040 1110 1160 1100 867 541 354 241 218	34 19 6 8 26U 142	 	191 146 80 28 8. 3. 4. 793 479
15 16 17 18 19 20 21 22 23 24 25 26 27 28	66 64 62 60 58 57 56 54 54 52 51	5556 7888 888 888 887	.9 .8 .8 .9 1.1 1.2 1.2 1.2 1.2 1.1	84 78 77 77 78 73 70 71 71 78 78		.4 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2	1040 1110 1160 1100 867 541 354 241 1218	34 19 9 6 8 26U 142	 	191 146 80 28 8. 3. 4. 793 479 278
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	66 64 62 60 58 57 56 54 52 51 50	5556 78888 8877	.9 .8 .8 .9 1.1 1.2 1.2 1.2 1.2 1.1 1.1	84 78 77 77 78 73 70 71 71 78 78		.4 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2	1040 1110 1160 1100 867 541 354 241 218 1076 1250 1210	34 19 9 6 8 26 142 85 36	 	191 146 80 28 8. 3. 4. 793 479 278 99
15 16 17 18 19 20 21 22 23 24 25 26 27 28	66 64 62 60 58 57 56 54 54 52 51	5556 7888 888 888 887	.9 .8 .8 .9 1.1 1.2 1.2 1.2 1.2 1.1	84 78 77 77 78 73 70 71 71 78 78	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	.4 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2	1040 1110 1160 1100 867 541 354 241 218 1076 1250 1210	34 19 9 6 8 26U 142	 	191 146 80 28 8. 3. 4. 793 479 278

E Estimated. S Computed by subdividing day.

239

### TRADEWATER RIVER BASIN--Continued

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

Suspended sediment, water year October 1962 to September 1963--Continued

		APRIL			MAY				JUNE	
		Suspen	ded sediment		Suspen	ded	sediment		Suspende	ed sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)		Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	258	8	5•6	522	58		8.2	55	4 1	0.6
2	2 1 0	6	3 • 2	359	20		19	49	5	• 7
3	170	5	2 • 3	203	19 17		10	47	5	•6
5	146 130	5	2.0 1.8	139 107	16		6 • 4 4 • 6	42 40	5	•6 •5
		i			i					
6	120	4	1.3	89	15		3.6	37	5	• 5
7 8	109 104	2 2	•6	77 71	15 15		3 • 1 2 • 9	36 35	5 ' 5	• 5
9	98	2	•6 •5	68	15		2.7	33	5	.4
10	91	2	•5	66	15		2.7	31	5	• 4
- 1					15			32	5	• 4
11	88 79	2 2	•5	64 67	16		2.6	32	7	• 6
13	77	2	.4	180	64	5	33	36	8	.8
14.0	74	2	.4	193	187	1	97	30	5	• 4
15	7 2	2	•4	114	125		38	27	5	• 4
	72		,	77		E	17	32	7	•6
16	72	2 2	.4	70		E	8	35	11	1.0
18	76	2	.4	65		E	4	40	11	1.2
19	76	2	•4	61		E	2	38	11	1 • 1
20	72	2	•4	58	4		• 6	37	11	. 1.1
21	70	2	.4	5.4	4		•6	36	1.1	1.1
22	6.7	3	.5	52	4		•6	38	12	1.2
23	6.8	9	•6	49	4		• 5	32	12	1.0
24	74	3	•6	47	4		• 5		15	1 • 2
25	72	4	.8	46	4		• 5	29	12	• 9
26	71	4	-8	47	4		-5	28	1 12	• 9
27	70	3	•6	48	4	ł	• 5		12	• 9
28	67	3	• 5	61	4	ĺ	•6	32	12	1.0
29	77 358	20 179	5 177	91 72	5		1.2	28 24	13	1.0
31	356	117	3 1//	64	5	1	.9		17	
Total	3173		208.5	3281		<del></del>	349.3	1050		23.0
		JULY			AUGUST				SEPTEMBER	
						7				
1 • • 2 • •	22 29	17 20	1.0	32 27		E	13	1 • 5 5 • 2	6 15	T U•2
3	47	20	3.0	25		É	5	12	24	• 5
4	3.8	22 .	2 • 2	23	43	_	2.7	9.9	22	•6
5	4.7	25	3 • 2	22	26		1.5	8 • 6	18	• 4
6	4.7	23	2.9	20	22		1.2	8.6	15	
7	46	21	2.6	20	22		1.2	6.4	12	• 2
8	43	18	2 • 1	23	21		1.3	4.6	7	• 1
9	42	18	2.0	22	21 20		1.2	3 · 8 2 · 9	5	•1 T
10	42	18	2.0	21	20		1.1	2.9	2	'
11	41	18	2.0	18	20		1.0	1 • 8	5	7
12	39	19	2.0	18	20		1.0	1.8	5	Ţ
13	41	16	1.8	2⊍	20		1 • 1	1.8	5	1
14	47 47	16	2.0	22 19	20 20		1.2	1 • 2 1 • 1	5	1
- 1										
16	49	19	2•5	19	20		1.0	1 • 1	5	Ţ
17	4.7	16	2.0	13	20		• 7	1 • 1	10	Ţ
18	44 53	14 30	1.7	11 12	20 19		•6	• 9 • 8	12	Ţ
20	53	28	4.0	12	17		•6	•6		Ť
21	46	24	3.0	11	16		• 5	•6	8	т
22	40	20	2.2	10	15		• 4	• • • • • • • • • • • • • • • • • • • •	8 ,	+
23	35	20	1.9	8.5	14		• 3	• 3	7	Ť
24	34	20	1.8	7.3	13		• 2	• 2	7	Ţ
25	36	20	1.9	6.4	12		• 2	• 1	7	T
26	34	20	1.8	4.9	10	,	• 1	• 1	7	Ŧ
27	33	20	1 • 8	3.6	9	:	•1	v		U
28	32 34	20	1 • 7	2 • 2 1 • 5	8	1	ī	0		0
30	70	79	5 18	1.4	7		Ť.	Ü		ő
31	5.5	234	35	1.4	7		Ť			
2										
Total	1313		117.8	457.2			47.2	77.5		3.0

TRADEWATER RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis B. bottom withdrawal those C. chemnically dispersed: D, decardation; M, in native water; or sizes v visual accumulation the W in distilled water)

				P, pipet;	S, 81eve; V, 1	P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water	n tabe;	, H	stilled 1	vacer							
		00 00	Water		Sediment	Sodimont					Suspended sediment	ed sedi	nent				Mathod
Date of collection	Time (24 hour)	ling	ling per-	Discharge (cfs)	concen- tration	discharge		A	ercent	finer t	an size	indicat	ed, in n	Percent finer than size indicated, in millimeters	8.		jo
		point	(F)	Ì	(mdd)	(tons per day)	0.00	0.004	000.0	0.016	0.031	0.062	.125 0.	. 002 0. 004 0. 008 0. 016 0. 031 0. 062 0. 125 0. 250 0. 500		1.000 2.000	analysis
Oct. 13, 1962	1725			292	310		78	22	98	96	86		8				SBWC
Mar. 5, 1963	_	_		1390	655	_	22	29	28	94	26	86	100	_			SBWC
far. 5				1390	655		45	62	22	06	92		00				SBN
Mar. 17				1050	430		9	92	87	92	26	_	8				SBWC
Mar. 17				1050	430		22	67	83	96	86		00				SBN
May 14		_		216	216		74	88	26	86	66	_	00		_		SHWC

### CUMBERLAND RIVER BASIN

3-4035. CUMBERLAND RIVER AT BARBOURVILLE, KY.

LOCATION. -- Temperature recorder at gaging station at bridge on State Highway 11, at Barbourville, Knox County, 0.4 mile upstream from Richland Creek.

PRAININGE AREA, --960 square miles. October 1949 to August 1950.

\*\*RECORDS AVAILABLE.--Chemical analyses: October 1963

\*\*RETRIESE, 1962.-Chemical analyses: October 1963

\*\*RETRIESE, 1962.-Aiter temperatures: Maximum, 61°F July 18, 27, Aug. 5, 21; minimum, freezing point on several days during Willer months.

\*\*WIREE, 1949-63.--Maret temperatures: Maximum, 91°F June 28, 1952; minimum, freezing point on many days during winter months.

\*\*REMARKS.--Temperature record missing dan, 24 to Mar. 14.

				-	dma	5 5	Wic	Twice-daily	71		easurem	ment	water year October 1902 to lents at approximately 0800	apj	approximately 0800	imat	tely	080		and 1700)	700)	COST	2								
1														_	Day															Aver	
Month	-	2	3 4	4 5	9	-	8	6	10	Ξ	12	13	14	15	91	17	18	19	20	21 2	22 2	23 2	24 2	25 2	26 27	7 28	59	30	31	age	
October	-	-	-	-	-	<u> </u>	-	-	_		_								-		<del> </del> —			-		H	_	L			
a. a.	75 7	-			73 73	_					74	73	62	55	54	52	96		25	53			52		53 5		_	54	57	63	
р.н.		78 7	78 78	_	7 78	_	16 76	_	76 78	16		7.5	_	54	5.7		09	63	49	99	75	55		54.5		58 61	63		_	67	
November	4	63	5.5			_	5.0	77	4	4.7	3	9	i,	52	it.	2,0	- 99	4	ď	5.6	- a	5.5	5.7	5.5	4	7	4		_	ď	
		_		_	58 59	_	56 54	_				. 5			1 30		29	_								51 47	-	1 4	-	1 6	
December					-	_					_				·			-	_								_			)	
а. ш. е		_		_		_	35 36	_	34 33		1	32		33	34		32	-	33		_					33 33			36	35	
D.B	47 4	40	30 44		38 34	_	33 37	_	3 32	"	1	32	34	3.5	37	35	36	80	0.5	7 7 7	E #	42 3	3.8	35 3	34 3	38 3	۰,	39	_	37	
January	36		7 27		36		3.5		33		č	ď	3.5	3.5	- 2	-		4	u e	4	3.6	1 0	-	- 1		_;		- 1	1	;	
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February				* 7 7			x x							ç	7		<b>.</b>		, ,					_							
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n.o.	1	-	1		1	_	1	·	1	1	1	1	1	1	1	ł	1	1	1	+	1	1	1	-	1	1	1	1	1	1	
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May	1,	_										_			0		- 3							, ,	_				4	7.7	
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June	58	62	9 09		65					7.5		7.0		7	٥,	0	29		61	66		9 + 9		61	9	9 7 9	69				
а.п.	68 7	75 7			70 69	_	10 69	_	70 71	_	75	7.2	7.5	17	7.2		7.1		7.5		20	70 7	7.1					71 80	!	7.2	
D.m.	75 7	71 7	72 7	70 7	70 71	_	71 72	_	75 78	78	7.8	7.8	7.8	7.5	7.1	7.1	7.1	17/	2.5	78	1.5	7 5 7	_	79 8	80 8	80 80	_	79 80	ŀ		
July				_	- 1			_		_		_	(	,	- ;		9.	-			-			7.2		9 0	_	36 76	7,7		
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Angust													2/	ζ.	7/		 R		<u>.                                    </u>		<u>.</u>			<u>.</u>		7 8		-			
B. B.	74 7	74	75 7		78 77		74 78	_	78 80	7.5	7.8	79	74	73		14	74	45	7.5	7.5	15	767	78		77 7	76 76		77 76	7.5	16	
D.B.				80 8	8180	_	70 80					_					16	16	9.2	18	9.	198		80 7		78 7		80 79			
a.m	75 7								70 72				20	7.0	7.1	10	20	10	2.0		20									70	
D.B	76 7	78 7	75 7	19 7	78 78		78 78		78 76	7	78	7.5	7.5	7.1	14		73		72	12	0.	207	202	9 89	65 6	99 99		29 29	1		

## 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, 2.5 miles northeast of Parkers Lake, and 2.6 miles east of Greenwood, McCreary

OCOUNTY.

RECORDS ANIALABLE.—10 67 Square miles.

RECORDS ANIALABLE.—10 67 Square miles.

RECORDS ANIALABLE.—10 67 Square miles.

RECORDS ANIALABLE.—10 67 Square is a speciment of speciment 1956.

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

Sediment records: January 1956 to September 1962 in the sed of the s

			Col-	5	1	1	!	1	ļ	7	ł	!	က	1	;
			Hd		3.4	3.2	3.0	2.9	3,3	3,3	3,5	3.2	3,3	3,3	3.4
	Cuccific	Actd- conduct-	ance	mhos at 25°C)	674	558	627	969	406	557	537	648	636	637	552
		Ac 1 d-	1 ty		1	1	!	ŀ	1	1.6	i	ł	1.8	-	1.3
	ness		Non-	carbon- ate	1	;	1	1	-	135	1	ŀ	153	1	1
	Hardness	as CaCO	Cal-		1	ł	1	1	1	135	1	1	153	1	1
		Dissolved.	solids	at 180°C)	1	;	-	1	•	287	;	ļ	347	S I	1
1963		į	trate	(NO <sub>3</sub> )	1	!	i	1	I	0.1	1	1	2.	1	1
emper		í	ride	(F)	1	1	ł	1	1	0.2	1	1	e	1	1
Chemical analyses, in parts per million, November 1962 to September 1963			Chloride	(5)	1	!		;	}	2,5	ł	1	2.5	1	1
vember 19			Sulfate	)* Oci	242	192				186	190		214		
ton, No		i	bonate	(HCO <sub>3</sub> )	0	0	0	0	0	0	0	0	0	0	0
r m111		Po-	tas-	(K)	;	ļ	1	1	ļ	2.0	;	}	2.8	;	1
parts pe			Sodium	(ING)	1	1	1	1	1	1.5	-	1	2.0	1	}
ses, ir		Mag-	ne-	(Mg)	ţ	1	1	;	1	17	1	ţ	22	1	1
l analy		ç	cium	(Ca	1	i	1	í	1	56	١	1	22	ł	1
hemica		Man-	ga-	(Mn)	1	1	1	1	ţ	10		ŀ	12	1	1
Ų			Iron	(a.g.)	1	ł	;	i	1	4.4	;	;	4.0	;	ţ
			Alum inum	( <b>V</b> )	1	ŀ	;	}	1	5.3	í	}	5.7	ļ	1
			Silica		1	;	1	1	ł	0.6	1	1	14	i	1
			Discharge	Ì	0,1	.2	-	1.2	1.7	e.	+				۲.
			Date	collection	Nov. 2, 1962.	Nov. 19.	Dec. 10	Dec. 21	Mar. 1. 1963	May 26	June 24.	Aug. 5	Sept. 10.	Sept. 17	Sept. 24

Periodic determinations of suspended sediment, water year October 1962 to September 1963

T Less than 0.005 ton.

## CUMBERLAND RIVER BASIN--Continued

3-4141.1. CUMBERLAND RIVER NEAR BURKESVILLE, KY.

LOCATION.--At Neelys Ferry on State Highway 61, 0.5 mile downstream from Raft Creck, 3.2 miles south of Burkesville, Cumberland County, and about 73 miles downstream from gaging station near Rowena.

DRAINGE AREA.--6, 050 square miles.

RECORDS AFAILABLE.---Chemical analyses: January 1952 to September 1954.

Water temperatures: October 1949 to September 1951 (at Burkesville), January 1952 to September 1963.

EXTREMES, 1962-63.--Water temperatures: Maximum, 59°F Sept. 20-23; minimum, 42°F Lan. 29 to Feb. 4.

REMARS.---For discharge records available.

Month																Day															Ą	Aver-
Month	-	2	8	4	5	9	2	8	6	01	=	12	13	14	12	16 1	17 1	81	19	20 2	21 2	22 2	23 2	24 2	25 2	26 2	27 28	3 29	30	31		age
October a.m p.m	56	57	57	5.5	5.8	8 80	80 30	5.8	25	5.4	200	55	0.0	55	6.0	56	55 55	55	0.0	r. 3	6.6	55	5.5	20.0	20.00	5.5	56 56		56 55 55 55		555	56
a.m.c.	5.5	5.6	56	95	56	55	55	56	20	5.5	2.5	2 4	2.0	2.2	1. 1. 1. 1. 1. 1.	in in	55.5	4 4	5.5	£ £	5 4 4	24	44	44	55 5	2.0	54 54		54 54 54 54		11	55
a.mp.u	9.0 2.0 2.0	4.4	4 4	54	4 4	40	7 4 5	4 4	44	27	533	5.53	W W.	E 70	53 5	4 4	53.5	533	53.5	53	50	53	23	2.2	53	200	53 53		53 53		53.4	53
January a.m p.m	ν. υ. ε.	ψ. W.	رى بر چى بد	000	50	0 5	0 0	0 0 0 0	6 6 7	0 0	9 4 4	4 4 5 6	9 9 9	7 7	11	4.3	7 4 7 7 7 7 7 7	6.6	£ 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	6.6	25	4 4 6 6	7 7 7 7	4.4	44	2 4 4	4 2 4 3 4 3		45 45		7 7	4 4 W W
a.m p.m	42	45	45	4.3	6 4	r r 7	4 3 2	43	63.4	43	43	4 4	43.	# <del>4</del>	4 3 4	2 4 4	43 4	45	45.	2 4	2 4 2 0	£ £	40 4	44	t t t t	4.5	94 94		11		11	4 4 4 4
a.m p.m	4 ¢	46	4 6	94	4.7	47	47	47	47	47	47	46	44	9 7 9 7	4 9 4	94,	7 97	9 4 9	4 2 2	2 2	t 2 t	9 4 6	4 4 4 0 4 0 4 0	94	4 4	7 9 4 9 4	40 40 40 40 40 40	~ 4	94 94		9 7 7	4 4 6 4
April a.m	4 4	4 te	4 4	4 4 4 9 4	9 4 9	9 4 9	94	4 4	4 4 4 4	9 9	4 4	9 9	9 4	9.6	3 3 3 3	4 4 4 4	3 3 3 3 3 3	40	9 3	9 9	9 4 4	9 4 4 9 9	4 4	9.0	9 9	2 2	4 4 9 9 4 4	4 4 9 4 9 4 9 4	46 47			4 4 6
a.m.	47	47	4 7	8 6	4 4 8 8	0 E	848	J. 0.	50	5.0	500	200	5.0	500	50.5	2.5	51.5	51	22	51	52	5.2	52 5	52	52 5	52	52.5	52 5	53 53		533	50
a.mp.	υν ε' ω	53	ر بر 14	24	54	54	44	7.4	2,4	5.5	40	2.00	4.0	5.50	555	15 TZ	25	555	55	56	56	56	56 5	5.6	5.50	55	55.5	555	56 56		11	55
July a.m.	56	56	5.6	56	56	56	3 5	56	25	5.5	5.5	5.5	2.0	25	2 4	5.5	44	4 4	4 4	4 4	4 4	4 6	5.5	5.5	5.55	5.5	5 6 5 5 5 5 5 5	56 5	56 56		5 6	5.5
a.mp.m.	56	56	5.6	56	56	57	52	57	57	75	5.5	57	57	57	36	56	56 5	56	56	56	56	56	56 5	56	56 5	56	555	55 55	55 55		555	56 56
September a.m	56	56	5.5 5.5	5.55	5.5	55	5.5	5.5	N. K.	56	56	5.5	4 6	5.6	586	80 80	20.00	8 8	80 80	9 0	5.0	9 9	5.9	20.00	20 00	20.00	5 5 C 8	8 9	1.8			57

#### CUMBERLAND RIVER BASIN -- Continued

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

LOCATION.—-Pemperature recorder at gaging station at bridge on U.S. Highway 60 at Smithland, Livingston County, 1 mile downstream DRAINGE ACCEPTAGE.——17.913 square miles.

DRAINGE ACES.——17.913 square miles.

RECORDS AVAILABLE.—-Chemical analyses: October 1949 to September 1950, October 1956 to December 1961.

Water temperatures: October 1949 to September 1963.

EXTREMES: 1992—26.——Mater temperatures: Maximum, 3ff Aug. 5; minimum, freezing point Jan. 28, Feb. 3, 1963.

EXTREMES: 1949—63.——Water temperatures: Maximum, 90ff Aug. 3, 1965; minimum, freezing point Jan. 28, Feb. 3, 1963.

vear October 1962 to September 1963 Temmerature ("F) of water

					Je.	mpe1	T.	re 1ce-	ature (°F) o. (Twice-daily	Temperature ('F) of water, water year October 1962 to (Twice-daily measurements at approximately 0900	wate	ar,	wate	at	app	Oct.	ober Lmat	f water, water year October 1962 to measurements at approximately 0900	95 t	o Se	September 1963 and 1600)	300)	136	23					ŀ		
Month															۵	Day															Aver-
Month	-	7	62	4	2	9	7	8	6	01	11	12	13	14 1	15 1	191	17 18	18	19 2	20 21	1 22	23	1 24	1 25	26	27	28	29	30	31	age
October a.m	2	<del> </del> —		—		0.2		0.2		70		7.1		7.2 7				70 6	69		69 67		99	9		61	61	63		0.9	89
D.m.	7.1	20	10	10	707		7.1	7.1	7.1		711		73 7		73 7	71 7	7 0 7	71 7	7 1 70		19 69		99 99	61	1 62	63	9	63	61	09	99
а.п	59	09		5.8			5.5	5.5		_	54 5					54 5	53	52 5	52 52	_	52 51		51 51	51	20		51	11	5.7	;	53
December	09	65	6.		99	99		5.5	54	55		5.5	55.5	55	55.5											5.1		: 5		1	4
а.в.	51	51	5.1						94		424					7 0 7		42 4										4.1		40	<b>†</b>
р.ш.с.				52 6	7 8 7	6 4	0,1	0 7		9 4		24	41 4	7 77	43		t 3		45 45		43 45		41 41	4.2	2 41	4.2	4.1	4.2	4 1	4.1	77
January																															
D. C.	t t	4 1	620	7 7 7	427		7 7	7 7	7 7 7	t t	t t	# C	1 1	0 4	t t	t t	i i	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	43 40		39 41		36 36	3,5	36.0	3 0	2 4	36	35	2 (C)	5 O
																												- 1			o ce
D. E.				36		39		_			. 6	30.0		9 9	30.0	0 0		_		_				_						1	9 6
March											0.7														4		, u	ű		ď	3
p.m.						6 4		2 7						52	53	54.	25.0	53.0	54 54		51 52		53 53		53 51			52	5.5	5.5	200
April																											_				
	υ τυ 4 τυ	4 4	. 4	55	0.0	9.0	5.4	4 5	ر بر د بر	2 4	54	n t	u tr	u ru	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2 2	57 58	_	58 59	_	59 61		60 60	4 6	63	9	9 9	9 9	9 7	1 1	. v.
Kay	0.9	_				63		5.5														_								7.0	2.4
E C						6.5		29	_							71 7							70 69		68 68				2	7.1	. 60
a.m	7.1	- 12	7.2					76	16				76 7		77 7.						74 74									1	4.5
d	7			<b>.</b>	<del>-</del>	<u>.                                    </u>	9			80	œ	oc .		80		9	9,	9/	76 75		2/2/		75		9/	7.8	- 48	4	8	1	92
July	7.9	79	-64	- 62	-18		-1	7.7					767	76			787	78 7	78 7									7		7.8	7.8
р.ш.						00		7.8	11		777				77 77	78 7			4 16		62 62		19 79	19	61 6	7.9	7.9	46	18	7.9	4.6
August.	79	4	79	7.9	80	80	- 61	18	19	18	78 7	- 82	77 7		75 7	74 7	74 7	74 7	75 74		74 74		75 76		76 76		7.7	77		76	7.7
D.B.		_						6 /						_		_		_	75 74		7.	_	16 76		92 92	7.7	18	7.8	11	16	77
September	74	73	7,4	4.4	7.3	74	14	14	14	73	757	. 92	75 7	74	74 7		4	_	5 7.		74 73		73 72	7.1	102	7.1	7.2		70	1	73
D.m.	47	74	74	14	73	74	75	_	7,4	14	76	. 11	757	_	75 74		74 7	74 7	75 75		74 73	_	73 72	_	1 7 1	7.1	73	7.1	69	1	74

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. DRAINGER. ARRA. --67. Square miles. RECOMES AVAILABLE. --Chemical analyses: October 1957 to September 1963.

Chemical analyses, in parts per million, water year October 1962 to September 1963

	Color	22	'n	22	20	ıO	10	10	12	ıO	15	10	
	띦	0.9	6.5	6.3	9.9	6.3	6.3	6.2	6.7	6.3	6.3	6.5	
Specific conduct-	E E	23	15	20	17	18	17	17	15	18	16	18	
Hardness as CaCO <sub>3</sub>	alcium, Non- nagne-carbon- sium ate	0	0	0	0	0	0	0	0	0	0	0	
	0.1	9	9	4	4	5	4	ın		9			
Dissolved	(residue at 180°C)	23	21	22	20	A 18	A 14	17	19	22	A 1.7	22	
ž.	trate (NO <sub>3</sub> )	0.0	٦.	٥.	ı.	.2	4.	0.	۲.	4.	ω.	. 7	
Fluo-	ride (F)	0.0	۲.	۰.	0.	۲.	0.	0.	0.	.1	٦.	٥.	
	(1.0)	1.7	1.7	1.2	1.7	1.8	ъ.	1.6	1.6	.7	1.0	1.2	
Sulfate	(30,	2.4	1.2	æ.	1.2	1.2	œ.	1.6	2	1.6	1.4	9.	
Bicar-	bonate (HCO <sub>3</sub> )	8	80	80	10	80	80	7	6	6	2	7	
Po-	stum (K)	8.0	9.	.5	. 4	9.	ů.	5	. 7	6.	1.0	. 7	
# 100 E	(Na)	1.5	1.4	1.6	1.8	1.7	α.	1.5	1.4	1.4	1.2	1.7	
Mag-	sium (Mg)	9.0	٠.	4.	4.	۳.	.2			4.			
Cal-	Cium (Ca)						1.4	1,1	1,4	1.9	1,4	1,3	
<u>.</u>	(Fe)	0.04	.02	.04	.03	10.	8.	.02	.0	.02	.02	10.	uents.
94150	(810,	4.1	7.8	7.5	7.1	6.5	5.2	5.5	8.0	7.3	7.2	8.3	constituents
Mean	discharge (cfs)	724	73	86	116	145	401	370	124	220	120	98	1 -
	Date of collection	Oct. 3, 1962	Nov. 5	Dec. 3	Jan. 3, 1963	Feb. 4		May 1	-	July 1	Aug. 2	Sept. 5	A Calculated from determined

TENNESSEE RIVER BASIN--Continued

3-4430. FRENCH BROAD RIVER AT BLANTYRE, N. C.

LOCATION (revised).--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 RESORDS Square miles. RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1957 to September 1963.

Chemical analyses, in parts per million, water year October 1962 to September 19

	Color	25	110	9	75	22	20	20	35	20	12	110
	<del>У</del> На	0.9	7.1	6.2	6.3	6.1	6.3	6,3	6.5	6.2	6.4	6.5
Specific conduct-	(micro- mhos at 25°C)	-			_			75				
Hardness as CaCO,	Non- carbon- ate							0				
Harc as C	Calcium, Non- magne-carbon- sium ate							10				
Dissolved	(residue at 180°C)							51				
, Z	trate (NO <sub>3</sub> )	1.0	۳.	œ.	.2	٦.	1.0	9.	٥.	٦.	ı.	2.1
Fluo-	ride (F)	0.0	.2	0.	0.	.2	•	0.	0.	٥.	٦.	3
	(CI)	2.8	8.0	6.1	5.8	4.7	2.0	4.1	4.1	3.0	4.0	7.7
Sulfate	(*os)	12	62	44	36	29	8.4	16	35	17	36	53
Bicar-	bonate (HCO <sub>3</sub> )	12	36	36	22	14	14	16	20	13	20	41
Po-	Stum (K)	1.0	1.4	1.0	6.	6.	9.	æ	α.	9.	1.8	2.9
Godium	(Na)						6.8					
Mag-	sium (Mg)	6.0	9.	.7	æ.	80.	4.	.7	.2	.2	. 7	8.
Cal-	cium (Ca)							2.9				
101	(Fe)	0,03	. 07	.07	80.	40.	90.	.03	.07	.02	8	40.
Gilfos	(SiO <sub>2</sub> )	5.8	9.1	8.2	7.6	7.2	6.3	6.2	8.6	7.5	8.4	9.3
Mean	discharge (cfs)	2510	335	260	612	773	1820	1400	209	1040	656	336
	Date of collection	oct. 3, 1962	S.	Dec. 4	4,	eb. 4	Mar. 20	ay 2	'une 5	July 2,	lug. 1	sept. 5

A Calculated from determined constituents.

TENNESSEE RIVER BASIN -- Continued

3~4480. FRENCH BROAD RIVER AT BENT CREEK, N. C.

LOGATION --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. BRAINGS ARBA. -676 square miles.

REAINGS ARALIBEE. --Chamical analyses: October 1957 to September 1963.

		Color	35	20	32	10	7	10	10	15	20	25	22	25
		Hd	8.9	9.9	6.5	6.4	6.4	6.3	9.9	6.3	6.5	6.7	6.3	9.9
	Specific conduct-	_ a	28	125	119	25	16	28	20	35	140	9	92	114
	Hardness as CaCO,	Calcium, Non- magne-carbon- sium ate	0		0				•	0	0	0	0	0
		<u> </u>	80	18	13	9		9	9	00	15	10	10	19
1963	Dissolved	(residue at 180°C)	29	82	84	A23	20	25	20	29	82	A45	09	74
tember	, i	trate (NO <sub>3</sub> )	0.1	4.	.7	٥.	.7	e.	۲.	٥.	6.	8.	4.	.7
to Sep	Fluo-	ride (F)	0.0	٦.	2.	Τ.	0.	0.	0.	0.	۲.	0.	۲.	ī.
water year October 1962 to September 1963	objection of	(CI)	2.2	5.7	1.6	1.8	6.	9.	1.6	2.4	4.5	2.4	2.8	3.1
year Oct	Sulfate	(30°)	2.6	56	36	2.6	1.4	2.4	1.0	4.3	24	13	16	22
	Bicar-	bonate (HCO <sub>3</sub> )	13	32	28	10	00	10	6	13	24	17	18	30
1111on	Po-	Sium (K)	0.7	1,2	1.0	9.	4.	9.	4.	۲.	1.0	۲.	6.	6.
Chemical analyses, in parts per million,	<u>.</u>	(Na)	2.2	18	18	3.0	1.2	2.6	1.5	3.7	17	7.9	11	16
, in pa	Mag-	sium (Mg)	6.0	1.3	е.	ē,	9.	٥.	6.	œ.	6.	. 7	4.	1.5
nalyses	cal-	clum (Ca)	1.4	5.0	4.8	1.4	1.8	1.4	1.3	1.8	4.6	2.6	3.4	4.8
nical a	101	(Fe)	0.10	.03	01.	10.	00.	10.	.05	.04	. 22	.04	.07	60.
Chei	GHISS	(SiO <sub>2</sub> )	8.5	9.6	9.1	8.1	7.4	7.2	7.4	8.1	9.3	6.8	6.6	9.3
	Mean	discharge (cfs)	1190	585	870	1110	1040	1880	1380	1110	902	948	648	206
		Date of collection	Oct. 9, 1962	Nov. 8	Dec. 19	Jan. 17, 1963	Feb. 18	Mar. 26	Apr. 10.	May 16	June 17	July 17	Aug. 12	Sept. 12

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 RAKE, ---Old Square miles.
RECORDS AVAILABLE. --Chemical analyses: October 1950 to September 1951, October 1956 to September 1963.

maten year Ortober 1069 to Contember 1063 Chomical analysis in name nor million

		Non- (micro- pH Color ate at 25°C)	138 6.2	205 7.0	6.4	140 6.2	115 6.5	0.9 96	125	140 6.4	9.9	140 6.1	157 6.9	210 7.0
	Hardness red as CaCO,	Calctur magne sturn		_				58 12			16 20			
er 1963		te (residue 3) at 180°C)									0 116		_	
Septeme		ride trate (F) (NO <sub>3</sub> )						.0	.1 1.7					
Chemical analyses, in parts per million, Water year October 1962 to September 1963		(C1)	<u> </u>		_		_	7.0			_			
year Oct	Sulfata	(80°)	27	44	42	56	22	11	16	22	33	30	47	61
1, water		bonate (HCO <sub>3</sub> )		_				22			29			_
millior.		Sium (K)	1.6	1.9	1.5	1.8	1.2	1.2	1.3	1.5	1.7	1.4	3.9	5
rrs per	a ii	(Na)			32				15					
s, in pa	Mag-	sium (Mg)						6.						
analyse		cium (Ca)	_						3,6					_
emicai		(Fe)	_	_		_		.02		_	.17	_		
Ġ		(SiO <sub>2</sub> )	9,3	10	8.6	9.3	8.8	8.2	8.1	0.6	11	0.6	6.6	11
	Mean	discharge (cfs)	1460	765				2360	1660	1380	1100	1340	785	618
		Date of collection	0ct. 9, 1962	Nov. 8	Dec. 19	Jan. 17, 1963	Feb. 25	Mar. 26	Apr. 10	May 16	June 17	July 18	Aug. 12	Sept. 16

A Calculated from determined constituents.

### 3-4535. FRENCH BROAD RIVER AT MARSHALL, N. C.

LOCATION.—At gaging station 0.7 mile upstream from Hayes Creek, 1 mile downstream from Ivy River, and 1.5 miles southeast of Marshall, Madison County.

REALANGE REAL—1.328 quare miles.

REALANGE REAL—1.328 quare miles.

Cotober 1965 to September 1963.

Whater temperatures: October 1967 to September 1963.

Whater temperatures: October 1967 to September 1963.

RAXIMUM, 186.963—1.3180.1 minimum, 18.3 ppm Mar. 1—17.

Hardness: Maximum, 20 ppm Mar. 28-13, 89pt. 1-15; minimum, 17.3 ppm Mar. 1—17.

Specific conductance: Maximum, 40.7 May, 20 microphos Sept. 13; minimum daily, 46 microphos Sept. 13; minimum daily, 46 microphos Sept. 13; minimum, 37 ppm Mar. 7—10, 1963.

RAXIMUM, 20 ppm Oct. 12, 1867 minimum, 13 ppm on many days in 1986-2.

Specific conductance: Maximum daily, 240 microphos Sept. 13, 1963; minimum, 37 ppm Mar. 7—10, 1963.

Specific conductance: Maximum daily, 240 microphos Sept. 13, 1963; minimum daily, 39 microphos Mar. 31, 1960.

Water temperatures: Maximum daily, 240 microphos Sept. 13, 1963; minimum daily, 39 microphos Mar. 31, 1960.

Water temperatures: Maximum daily, 240 microphos Sept. 13, 1963; minimum daily of many days in 1986-863.

		Color	82 9	233	30	6	27	۲,	8	ß	12	1	15	20	17	12	10	17	12	10	20
		Hd.	9.9		6.7	6.2	7.1	6.9	6.5	6.7	7.4	7.1		2.6	6.5	9.9	6.4	4. 7.	6.4	9.9	4.4
	Specific conduct-	(micro- mhos at 25°C)	180	110	168	82	110	011	140	06	115	42	011	145	06	54	83	52	382	105	109
	Hardness as CaCO,	Calcium, Non- magne-carbon- sium ate	0 -	100	0	-	0	-	o =	-	0	0	00	0	63	61	00	9 0	10	6	0
			24	187	22 22	16	16	8 9	19	16	19	17	16	19	17	14	22	14	12	52	16
1963	Dissolved	(residue at 180°C)	A110	A72	A112	1	80	16	9 84	A55	82	1	73	! !	A56	1	A53	A37	54.5	A70	70
tember	Ŋ.	trate (NO <sub>3</sub> )		9.60			2.1	2.0	4 1	1.8	2.4	1	8.6	1	3.5	1	4.4	ຕຸດ	2 .5	2.2	1.8
to Sep	Fluo-	ride (F)	0.1		•••	!	٥.	••	N 03	•		1	2.0	: 1	.2	!	۳,	٠.		.2	•
Chemical analyses, in parts per million, water year October 1962 to September 1963	والمار	(CI)	5.6			3.0	4.8	2.2	4.0	1.0	4.7	2.6	4 4	0.6	1.8	4.9	2.0	2.2	3.1	4.6	4.0
year Octo	Sulfato	(80)	4:	4. c	4 5	ŀ	23	24	33 %	17	56	1	22	56	15	7.6	14	4.0	12.	18	22
, water	Bicar-	bonate (HCO <sub>3</sub> )	28	288	2 62	18	24	<b>1</b> 3	3 2	18	24	20	2 52	53	19	14	17	10	19	56	24
llion	Po-	Sium (K)	2.0	1.5	8:1	2.0	1.6	1.5	2.1	1.2	1.3	1		1.5	1.0	1.0	2.0	4.6		1.2	1.2
rts per m	a ii	(Na)	25	13.	22	8.6	15	14	70	8.6	15	1	14	23	9.1	4.4	6.2	. v	7.7	9.5	4.
, in pa	Mag-	sium (Mg)	2.1		1.7	1.4	1.7	9.	1:5	1.9	1.2	l	2.5	!!	1.5	!	2.0		1.5	2.3	1.3
nalyses	Cal-	cium (Ca)	5.8	.0.0	0.9	4.2	3.9	4.6	2.0	3.2	5.6	1	9 4	1	4.3	1	5.1	9.6	3.6	6.1	4.5
nical ar	101	(Fe)	1.5	22.5	87.	.07	.14	40.		.02	.05	1	4.8	1	.03	!	10.	3.5	88	.05	.10
Che	641160	(SiO <sub>2</sub> )	12 8	115	17	3.5	77	Ξ;	12	10	=======================================	1	010	:	6.6	1	9.1	20 0 4. u		13	9.6
	Mean	discharge (cfs)	934	2244	1138	4225	1900	1654	1305	2132	1758	2080	1941	1560	2225	1970	10925	11094	4004	2512	2042
		Date of collection	Oct. 1-2, 1962	Oct. 6-10.	Nov. 1-9.	Nov. 10-11			Dec. 11-25		Jan. 1-13, 1963		Jan. 15-31			Mar. 4	Mar. 5-6	Mar. 7-10	Mar. 18-27	Mar. 28-31	Apr. 1-30

A Calculated from determined constituents.

TENNESSEE RIVER BASIN--Continued

3-4535. FRENCH BROAD RIVER AT MARSHALL, N. C. --Continued

		Color	10	22	20:	cr;	2	1	1	32	35	28	20	40	22
		Hd	6.7	6.9	6.7	5.3	2.0	7.5	7.1	7.3	7.2	6.7	6.3	7.0	1
	Specific conduct-	(micro- mhos at 25°C)	87	130	138	cZI	977	165	109	145	182	220	140	78	128
	Hardness as CaCO,	Calcium, Non- magne-carbon- sium ate	0	0	01	0	٥	0	4	н	0	0	ო	4	1
ned			41	82	8 9	9 9	2	20	18	20	21	22	20	14	18
3Contin	Dissolved	a Ci	A51	82	102	Abo	1,	ì	1	100	123	143	94	A57	86
er 196		trate (NO <sub>3</sub> )	1.4	2.1	2.7	7	7.5	1	1	2,3	2.4	3.9	3.8	3.7	2.5
eptemb	Fluo-	ride (F)	0.0	•	•	9.0		1	•	۰.	۲.	۲.	.5	.2	0.1
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued	Chloride	(CI)	2.4	0.4	ຫຸດ ຕຸ	•	2.5	2.2	3.8	2.0	5.8	7.9	5.3	3.4	4.6
r October	Sulfate	(*os)	13	56	35	52	ł	1	!	34	46	57	33	18	28
ter year		bonate (HCO <sub>3</sub> )	18	£ 2	5 2	OZ.	1	56	16	23	36	34	20	12	24
n, wa	Po-	sium (K)	1.0	1.5	1.7	-	,	1	!	1.6	1.7	1.7	2.2	3.9	1.5
er millio	Sodium	(Na)	10	91	19	7	77	1	ł	19	56	33	18	7.5	17
parts	Mag-	sium (Mg)	1.4	.;	9 9	9:	۲.6	1	1	1.7	1.5	2.0	1.3	1.0	1,5
ses, in	Cal-	cium (Ca)	3.2					!	!	2.0	6.1	8.9	5.6	4.1	4.9
analys	ron L	(Fe)	0.04	.13	01.	5.0	*5	1	ı	01.	00.	60.	Ξ.	.13	0.08
hemical	i i	(SiO <sub>2</sub> )	9.5	= :	122	,	1	1	ł	12	173	13	==	8.8	11
٥	Mean	discharge (cfs)	3090	1733	1360	0007	60/1	1320	1280	1515	1065	856	902	1876	1987
		Date of collection	May 1-7, 1963	May 8-31	June 1-21	June 42-30	Out, 1-9	July 10	July 11	July 12-31	Aug. 1-31	Sept. 1-15	Sept. 16-26	Sept. 27-30	Time-weighted average

A Calculated from determined constituents.

Temperature 'F of water, water year October 1962 to September 1963

	Aver-	age	55 36 36	4 3 3 3	56 70	73 77 68
		31	311	111	111	111
		30	34 150	4 1 2	202	73 74 66
		29	34 46	32	55 70 11	74 73 65
		28	9 4 4 9 2 2 4	32 35 51	58	74 75 64
		27	44%	33	63	74 78 66
		26	32	3 4 5 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	73	73
		25	34.4	4 4 5	56 70 72	74 78 69
		24	9 4 4 4 7	34 36 45	122	73
		23	344	38	65 70 70	72 78 62
_		22	8 4 8 8 4 8	432	56 69	71 74 76 79 64 63
183		17	3 4 8 8 4	34	55 70 70	71 76 64
0900 and 1835/		20	34 4	36	56 70 70	72 74 65
9		19	494	4 % 4 % 8 %	6.5	72 79 66
66		18	346	4 4 5°	58 70 68	74 80 69
neen		17	44 %	34 36 52	54 69 69	74 79 68
bet	Day	16	37 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	34 32 47	50	72 77 64
Conce-daily measurement between		15	55 32 32	36	50	74 74 68
rem		14	64 44 32	34 36 50	52 64 70	74 78 <b>6</b> 8
easu		13	44 44 32	4 6 4	55 68 70	74 79 69
Ä		12	64 44 32	34	54 70 70	74 78 65
121		=	34	4 8 4	53 69 70	47 77 40
-e-		10	62 44 36	3.9	52 62 69	72 74 94
ē,		٥	4 6 4 3 8	6 8 0 0 0	659	75 74 74
		8	94 94 34	36	53 66 72	70 80 74
		7	60 44 34	9 4 4 6	52	72 80 75
		9	62 48 42	3.6	53 62 70	73 78 71
		5	<b>62</b> 50 <b>44</b>	9 8 8 8 8 8	56 59	73 80 77
		4	60 50 46	34	60 58 70	424
		ო	50	6 6 4 5 6 6	58 58	47 79 77
		2	62 50 50	34 32 38	5.0	17 22
		-	400	3 3 3 4	5 88 65 65 55 55 55 55 55 55 55 55 55 55 55	73
	17-174	Month	October November	January February March	April May	July August September

### 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. DALIMAGE ARRA.-1,567 agrare miles of September 1946, October 1957 to September 1963. REMARKS.-No discharge records analyses: October 1945 to September 1946, October 1957 to September 1963. REMARKS.-No discharge records available.

		Color	20	30	12	12	38	10	10	12	17	12	17	22	
		甁	6.1	6.3	6.5	6.7	6.1	6.7	6.9	8.9	6.9	6.2	6.7	6.9	
	Specific conduct-	(micro- mhos at 25°C)	128	132	136	115	125	72	84	115	128	130	175	210	
	Hardness as CaCO <sub>3</sub>	Non- carbon- ate	0	0	0	9	က	0	N	0	0	0	0	0	
		Calcium, magne - sium	20	22	20	24	20	13	17	18	19	19	24	27	
1963	Dissolved	(residue Calcium, Non- at 180°C) magne-carbon- sium ate	A85	86	A93	A73	80	52	57	82	06	88	120	143	
tember	Ni-	trate (NO <sub>3</sub> )	0.7	0.		1.0	2.2	1.3	5.	1.0	1.7	~	1.0	3.	
to Sep	Fluo-	ride (F)	0.0	۰.	.5	2	2	۰.	•	٦.	۲.	°.	۲.	۲.	
Chemical analyses, in parts per million, water year October 1962 to September 1963	7. J. J. J. J. J. J. J. J. J. J. J. J. J.	(CI)	5.3	6.3	5.5	3.9	4.6	2.9	3.3	3.8	4.6	4.2	9.0	7.4	
year Oct	outeato	(SO <sub>4</sub> )	28	28	35	56	28	12	19	27	27	32	48	90	
, water	Bicar-	bonate (HCO <sub>3</sub> )	28	28	56	22	20	16	18	24	27	24	30	45	
1111on	-Po-	Slum (K)	1.7	1.5	1,3	1.3	1.8	1.2	1.2	2.5	2,2	1.4	1.8	3,4	
rts per m	ani poo	(Na)	17	17	20	12	16	8.0	9.5	16	18	18	56	32	
, in pa	Mag-	sium (Mg)	1.8	2.1	1.8	2.1	1.8	1.1	1.6	1.4	1.4	1.7	1.8	2.1	
alyses	Cal-	cium (Ca)	4.8	5.0	4.7	5.9	4.7	3.4	4.2	5.1	5.5	4.7	6.3	6.4	
nical ar	į	(Fe)	0.04	.02	.03	90.	40.	.02	.02	.03	10.	.02	00.	.02	ents.
Chen	Gillo	(SiO <sub>2</sub> )	11	9.1	11	8.6	9.6	9.5	7.7	70	11	10	11	7	onstitu
	Mean	discharge (cfs)													etermined c
		Date of collection	Oct. 15, 1962	Nov. 16	Dec. 16	Jan. 16, 1963	Feb. 18	Feb. 26	Apr. 16	May 15	June 17	July 16	Aug. 16	Sept. 16	A Calculated from determined constituents.

5 15 20 20 8 8 8

20 15 15 10

TENNESSEE RIVER BASIN -- Continued

ပ 3-4570. PIGEON RIVER AT CANTON, N.

LOCATION (revised)...-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, Raywood County.
DRAIMOG AREA.-133 square miles, approximately.
RECORDS AVAILABLE...-Chemical analyses: October 1967 to September 1963.

Color 6.3 6.3 6.3 6.3 6.52 Hd Specific conductmicro-25 20 20 20 20 20 20 20 20 20 20 mhos 00000 00000 at 180°C) magne-carbon-Hardness as CaCO, Calcium, . . . . . . . . . . . တစ္ က စ sium Dissolved 23 A21 20 A17 A18 20 20 (residue 23 20 21 22 22 solids Chemical analyses, in parts per million, water year October 1962 to September 1963 0.01088 trate NO,) Ni-44004 Fluoride (F) 200040 0000 1.9 00000 Chloride (CI) Sulfate (SO<sub>4</sub>) 404464 8.1.1.8 Bicar-bonate (HCO<sub>4</sub>) 21012886 6018918 Po-tas-sium (K) 0.824.4 6. 4. 7. 1. 8 4 4 6 6 4 2222 Sodium (Na) 0.0 **τ**0 0 0 0 4 Mag-ne-sium (Mg) Cal-cium (Ca) 46.04 4.11.12 0.00 22222 Fe) Silica (SiO<sub>2</sub>) 7.7 6.2 6.2 6.2 7.0 6.09 Mean discharge (cfs) 323 79 180 185 202 286 331 133 249 117 61 2, 1963..... 4. . . . . . . . . . . . . . Мау 3..... June 4...... 1,.... Aug. 2...... of collection Date Jan. Feb. Apr.

A Calculated from determined constituents.

TENNESSEE RIVER BASIN---Continued

3-4595. PIGEON RIVER NEAR HEPCO, N. C.

LICCATON --At gaging station, 0.8 mile downstream from Jonathan Creek, 2.0 miles south of Hepco, Haywood County, and 2.4 miles upstream from Fines Creek. DRAINGE REES. --350 square miles. October 1955 to September 1955, October 1957 to September 1953.

		Color	150	640	009	170	130	82	75	300	120	320	450
		뜀.	6.3	9.9	6.4	7.1	6,1	6.2	6.4	6.3	9.9	6.4	7.3
	Specific conduct-	(micro- mhos at 25°C)	205	160	503	370	245	220	300	200	330	570	068
	Hardness as CaCO,				32				28				
	Hard as C	Calcium, Non- magne-carbon- sium ate	44	154	85	88	48	38	62	93	87	126	188
1963	Dissolved	(residue at 180°C)	143	516	346	273	164	140	193	312	247		
tember	NI-	trate (NO <sub>3</sub> )	9.0	.7	9.		4.	1.2	4.	∞.	.7	6	1.5
to Sep		ride (F)	0.4	τ.	9.	4.	4.	٦.	.2	4.	۳.	4.	.2
Chemical analyses, in parts per million, water year October 1962 to September 1963	100	(C1)	39	163	104	80	48	42	22	110	69	128	185
year Oct	2,000	(SO <sub>4</sub> )	14	44	32	56	14	13			56		
, water	Bicar-	bonate (HCO <sub>3</sub> )	28	92	64	43	30	73	42	38	59	57	101
1111on	Po-	Sium (K)	1.6	2.7	2.5	1.8	1.6	1.5	1.8	2.3	1,9	2.2	3.7
rts per m	90 de 1	(Na)	21	92	67	42	78	22	31	28	38	65	100
, in pa	Mag-	sium (Mg)	1.3	2.7	1.7	1.5	1.3	∞.	1.4	2.3	1.8	2.3	2.7
nalyses	Cal-	ctum (Ca)	16	22	31	33	17	14	23	34	32	46	7.1
mical a	į	(Fe)	0.38		.30						.15		
Che	20110	(SiO <sub>2</sub> )	7.2	10	9.5	9.1	8.3	8.0	8.1	9.6	9.7	11	11
	Mean	discharge (cfs)	675	226	371	436	202	808	605	328	411	240	186
		Date of collection	Oct. 5, 1962	Nov. 1	Dec. 4	Jan. 3, 1963	Feb. 5	Apr. 1	Мау 6	June 4	July 3	Aug. 5	Sept. 6

Color

#### 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

DRAINGGA AREA.--49.2 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1962 to September 1963.
Maret remperatures: October 1962 to September 1963.
EXTREMES, 1962-63.--Water temperatures: Maximum, 66°F Aug. 28; minimum, freezing point on several days in Pebruary.

· Chemical analyses, in parts per million, water year October 1962 to September 1963

	<u> </u>	-										_	
	뙶	6.4	6.2	6.2	6.3	6.3	6.7	5.5	6.6	6.0	6,3	6.9	
Specific conduct-	<u> </u>	19	18	13	13	18	14	17	16	17	23	16	
Hardness as CaCO,	Calcium, Non- magne-carbon- sium ate	0	0	0	0	0	0	н	0	0	0	0	
Hard as C	Calcium, magne – sium	9	4	4	2	4	4	c	2	5	5	2	
Dissolved	(residue at 180°C)	A17	17	A15	A15	17	A12	20	22	22	20	20	
Ni-	trate (NO <sub>3</sub> )	0.5	4.	Э.	6.	0.	٠.						
Fluo-	ride (F)				_		۰.		۳.	٥.	0.	۲.	
Chloride	(C1)	0.1	9.	c.	3.	1.0	1.0	9.	1.0	1,1	1.0	6.	
Gulfata	(30°)	1,2	1.2	1.0	1,0	9.	1.0	2.2	1.0	2.0	4.	8.	
Bicar-	bonate (HCO <sub>3</sub> )	6	9	00	7	80	7	ß	10	9	6	11	
Po-	Sium (K)							1,3					
and in	(Na)						9.	1.1	1,5	1,3	2.0	1.7	
Mag-	sium (Mg)	0,5	4.	7.	4.	е.	.3	.5	۲.	.7	. 2	.7	
Cal-	ctum (Ca)						∞.				1.6		
100	(Fe)	0.02	00.	.01	00.	.01	.02	.02	.02	.03	. 02	10.	uents.
Gillo	(SiO <sub>2</sub> )	7.6	6.7	6.5	9.9	6,3	5.7	7.1	7.4	7.2	8.5	8.3	constit
Mean	discharge (cfs)	37	45	69	105	78	180	74	86	69	48	34	etermined c
	Date of collection	Oct. 18, 1962	Dec. 19	Jan. 9, 1963	Feb. 13	Apr. 28	May 1	Мау 30	June 22	July 28	Aug. 22	Sept. 6	A Calculated from determined constituents.
											•		

TENNESSEE RIVER BASIN--Continued

3-4600. CATALOOCHEE CREEK NEAR CATALOOCHEE, N. C.--Continued Temperature °F of water, water year October 1962 to September 1963

Gontinuous ethyl alcohol-actuated thermograph

130 180 400 120 140 45 210 220 --

Color

TENNESSEE RIVER BASIN -- Continued

3-4607.66. PIGEON RIVER AT WATERVILLE, N. C.

LOCATION.--From tailrace of Carolina Power and Light powerplant about 7 miles below Waterville Lake at Waterville, Haywood County.
DALINGE AREA.-558 square miles.
RECORDS AVAILABLE.-Chemical analyses: October 1957 to September 1963.
REMARKS.--No discharge records available.

		ŭ	_	_	4		-						
		핊	6.5	6,4	9.9	6.2	6.5	7.3	6.6	6.4	7.2	7.2	7.0
	Specific conduct-	(micro- mhos at 25°C)	395	315	420	250	225	220	240	322	340	312	462
	Hardness as CaCOs	Calcum, Non- magne-carbon- sium ate	30	56	37	28	21	14				30	
		Calcum, magne - sium					_	48				70	
1963	Dissolved	(residue at 180°C)	248	210	287	170	166	136	154	209	216	227	303
tember	Ni-	trate (NO <sub>3</sub> )	0.2						1.5	4.	4.	4.	9.
to Sep	Fluo-	ride (F)	0.2	.2	е.	۳.	۳.	٦.	.2	~	.2	۳.	.3
Chemical analyses, in parts per million, water year October 1962 to September 1963	Chloride	(CI)	72	99	84	20	46	37	42	61	64	67	94
year Oct	օրպութ	(30°)	23	18	28	16	16	13	13	16	18	36	56
, water	Bicar -	bonate (HCO <sub>3</sub> )	73	49	56	34	36	42	40	44	62	20	70
1111ion	Po-	Sium (K)	3.0	2.0	1.9	1.7	1.6	2.2	1.9	2.2	4.8	2.0	4.8
rts per 1	Sodium	(Na)	43	36	20	59	27	24	22	34	39	40	57
', in pa	-geW	sium (Mg)	1.9	1.8	1.9	1.6	2,1	1.4	1.2	1.8	1.5	1.6	1.8
nalyses	Cal-	cium (Ca)	ı					17	18				
ical a	Trop	(Fe)	0.07	.36	9.	. 28	.33	.18	.31	.73	.38	.50	.43
Chen	eilica	(8102)	9.7	9.8	8.6	8.5	8.1	6.8	8.3	9.2	8.9	9	8.6
	Mean	discharge (cfs)											
		Date of collection	Oct. 16, 1962	Nov. 20	Dec. 24	Jan. 21, 1963	Feb. 13	Apr. 8	May 18	June 18	July 16	Aug. 12	Sept. 16

TENNESSEE RIVER BASIN -- Continued

3-4633. SOUTH TOE RIVER NEAR CELO, N. C.

LOCATION (revised).--Temperature recorder at gaging station 800 feet upstream from bridge on Secondary Road 1169, 0.3 mile downstream from White Oak Creek, DRAINAGE AREA.--43.4 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1958 to September 1963.

EXTREMES, 1962-63.--Water temperatures: Maximum, 76°F Aug. 5, 8; minimum, 33°F on several days in January and Pebruary.

EXTREMES, 1968-63.--Water temperatures: Maximum, 76°F Aug. 1, 1961; minimum, freezing point on several days in 1958-60.

October 1988 to September 1963. Maximum, 76°R Ang. 5, 8; minimum, 33°F on several days in January and Pebruary. Maximum, 78°F Ang. 1, 1961; minimum, freezing point on several days in 1958-60.

Chemical analyses, in parts per million, water year October 1962 to September 1963

						-				continuation of the state of th								
	Mean	1100		Cal-	Mag-	adim	9. t	Bicar-	gulf oto	Chlorida Chief	Fluo.	, N	Dissolved	Hardness Spec	sss O,	Hardness Specific as CaCO, conduct-		
Date of collection	discharge (cfs)	(SiO <sub>2</sub> )	(Fe)	ctum (Ca)	ctum stum (Ca) (Mg)	(Na)	Sium (K)	sium (HCO <sub>3</sub> )	(80,	(CI)	ride (F)	trate (NO <sub>3</sub> )	City (F) (NO <sub>2</sub> ) at 180°C) magne-carbon minos sium ate at 25°C)	Calchum, magne-ca sium	Non- rbon-	micro- mhos nt 25°C)	pH Color	olor
Oct. 10, 1962	113	5.3	0.02	1.4	0.4	113 5.3 0.02 1.4 0.4 0.6 0.4	0.4	9	1.2		1.0 0.1 0.2	0.2	A14	ıo	0	16	16 6.0	52
lay 14, 1963	8.99	0.9	00.	1.6	9.	6.	e.	10	1.2		٠.	0:0		9	0	14	7.0	ເດ
A Calculated from determined constituents.	termined cc	nstitu	ents.															

TENNESSEE RIVER BASIN--Continued

3-4633. SOUTH TOE RIVER NEAR CELO, N. C. -- Continued

Temperature °F of water, water year October 1962 to September 1963

### 3-4855. DOE RIVER AT ELIZABETHTON, TENN.

LOCATION. --Tomperature recorder at gaging station, 1,500 feet upstream from bridge on State Highway 91 at Elizabethton, Carter DRAINGE and all all operature from mouth.

DRAINGE AREA. --137 square miles.

RECORDS ANILABLE. -- Water temperatures: February 1954 to June 1963 (discontinued).

EXTREMES. 1964-63. -- Water temperatures: Maximum, 73° June 10; minimum, 94° poc. 10-15.

EXTREMES. 1964-63. -- Water temperatures: Maximum, 82°F July 14, 1994; minimum, freezing point on several days during December 1954 and January 1999.

Temperature (°F) of water, October 1962 to June 1963 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)

;	<u> </u>		1	necoures with respectance attachment, company villy account account attachment of the property	5		3	1		d					Ĭ	Day										ì l					A A	Aver-
Month	Ľ	2	3	4	2	9	-	8	6	91	=	12	13	14	15	1 91	17 18	8	19 2	20 2	21 2	22 23	3 24	4 25	5 26	5 27	7 28	3 29	9 30	31		age
October										_																						
Minimum	. 55	50	61	61	53	62	409	۲ × ۲	63	40.0	594	40.0	7 Y	62	62 6	61 6	60 53	260	10.70 12.41 10.10	r e	50 50	5.5	55 53 48		4 x 4 6 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5		41 45		51 54 47 51	478		55
Maximum Minimum	50	4 4	¢ 4 7 7 4 7	0 4 4	4 4 a n	4 4	4 4	4 4 C U	1, 4	0 1	0 4	0 4	7 4 4	4 t	4 5 4	8 7 7	£ 4	4 8 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		50 4	4 4 4	45 44		44 44		39 42		50 48	11		4 4 5 6 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
Maximum	4.5	44	44	47	43	43	4 E	0 4	0 %	5.4	3 3	34	4 4	4 4	34 3	35	9.8 9.8	35.3	38 41		42 41 41		42 40		39 41		42 43		43 43 38			38
January Maximum Minimum	. :	37	38 4	3.3	2 4	4 1 2 2 2	4 2	4 5	1 K	3.9	4 4 0 0	4 4 6 6	2 6	36	37	20 50	9.00	37	39 4	6 7 3	36	8 4 8 4 8 4 8 4 8 4 8 8 8 8 8 8 8 8 8 8	38 37		36 36		36 36		36 38		98 7	3.7
Maximum		9 6	4 k	9 6 6	24.	4 0	47	4 2 2	30	40	£ 2 4	4 4 4 C	400	38	37 40	4 F.	3 4 3 4	38 4	44	4 C 4	4 6 7 4	4 6	42 48 40 40		77 U7		41 40		11	11		3.9
Maximum	4 4	4 4	44	C 4	r, 4	r 4	1 1 L 1	0 4	4 4 m n	50	4 4 0 n	C 7	52	46	0 4 0 4		ر ب 4	4 0	54 5	47	7 4 7 8 7	4 4	47 50		48 51		8.4 8.4		57 59		52 9	51
April Maximum Minimum	. :	4 n	6.4	6.4	4 -		7 7	1 0	υ υ υ υ	4 t t	r C	r 0	707	η 4 C α	4 7 A A	6 4	4 C Z	- 4 4 2 4 4 1 4 4		- 4 4 - 4 1	64 47 54 40		4 99		7 Y J		2 c c c c c c c c c c c c c c c c c c c		7 8 8 7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4			4.4
Maximum Minimum	51	R 4	51	4 4	£ 4	ας	άū	8 C	5 2	2 6	1,4	60	5.5	49	2 y	100	62 8 8	0.8.8.	62 68 68 68	. a	50 5	57 5	57 54		5.0 A.2.		61 64 57 59		63 65		200	10 th
Maximum	60	99	66 60	62	59	65	69	63	72	73	72	70	71 7	6.7	71 6	69 6	65 6	65	68 6	63 6	61 5	59 6	66 68 60 60		67 67 61 62		54 63 54 63		71 71 65	11	$\Box$	68 62

TENNESSEE RIVER BASIN -- Continued

3-5105. TUCKASEGEE RIVER AT DILLSBORO, N. C.

LCATION.--At gaging station, 0.4 mile downstream from Scott Creek, and 0.5 mile downstream from U.S. Highway 23 at Dillsboro, Jackson County. REMNAGE AREA.--347 square miles.
RECORDS ARIALA-Chemical analyses: October 1957 to September 1963.

Color 150 150 150 150 10 25 24 24 30 30 30 30 30 4.00.00 6.9 핂 222 222 63 63 82 82 30 Specific conduct-24 94 128 105 27 23 mhos at 25°C) (microance at 180°C) magne-carbon-000000 000000 Calchim, Non-Hardness as CaCO, 8 10 10 8 8 sium Dissolved A22 84 144 103 A24 A24 37 49 44 74 74 74 (residue solids to September 1963 Ni-trate (NO<sub>s</sub>) 2024.00 4.6.0.0.0. Fluo-ride (F) 0.48800 0 11 10 11 0 11:15:23 4.22.1. parts per million, water year October 1962 Chloride <u>(</u> 1.0 26 18 18 18 1.6 2.88.84 Sulfate (SO<sub>4</sub>) 12 12 12 10 Bicar-bonate (HCO<sub>3</sub>) 15 21 18 18 12 12 Po-tas-stum (K) 0.7 8.9 1.1 7.7 95.55.23 1.8 28 19 19 2.1 Sodium (Na) C. 6. 6. 1. 6. 0.6 .9 .9 .7 Mag-ne-stum (Mg) analyses, in 202244 846464 Cal-ctum (Ca) 0.03 818888 Iron (Fe) Chemical Silica (SiO<sub>2</sub>) 6.6 98869 Mean discharge / te 392 616 366 366 545 846 1580 762 449 519 330 564 798 18, 1963..... 4..... 31, 1962.... 9..... 22..... Мау 20..... June 17..... Date of collection Jan.

A Calculated from determined constituents.

TENNESSEE RIVER BASIN -- Continued

3-5130. TUCKASEGEE RIVER AT BRYSON CITY, N. C.

		Color	_	_				30		40	97	48	901	110
		甁	6.1	6,1	6.2	9	6.5	6,3	6.9	6.4	6.2	6.1	6.9	6.1
	Specific conduct-		69	62	132	09	09	38	23	54	38	43	89	105
	Hardness as CaCO,	, Non- (carbon-	0	0	0	0	0	0	0	0	0	•	0	0
	Hard as C	Calctur magne sium	8	9	80	9	9	2	00	2	9	7	8	8
1963	Dissolved	(residue at 180°C)						31			38			
tember	Ni-	trate (NO <sub>3</sub> )	1.2	1.7	1:1	1.3	1.4	ο.	4.	6.	ī.	.5	8.	6.
to Sep	Fluo-	ride (F)	0.0	٥.	2	2	o.	٥.	•	۰.	٠.	۳,	۲.	.2
water year October 1962 to September 1963	Chloride	(CI)	1,3	1.8	6.	2.3	1.2	1.5	1.2	1.0	.5	1.5	1.4	1.9
year Oct	Sulfate	( <b>*0</b> s)	12	11	28	11	12	5.6	1.6	8.4	7.2	2.8	20	25
, water	Bicar-	bonate (HCO <sub>3</sub> )						12		19	14	12	56	28
1111on	Po-	Stum (K)	0.7	۲.	1.0	6.	۲.	۲.	1.1	φ.	1,3	8.	1.8	2.3
Chemical analyses, in parts per million,		(Na)	10	9.6	56	10	10	4.5	2.0	7.5	5.5	5.4	17	19
, in pa	Mag-	stum (Mg)	0.5	۳.	æ.	9.	4.	s.	9.	9.	۳.	ď.	۵.	.3
nalyses	Cal-	ctum (Ca)						1.2		1.8	2.2	2.0	2.6	2.6
mical a	<u> </u>	(Fe)	00.00	8.	60.	.02	. 03	.02	00.	90.	.04	90.	.01	.03
Che	911163	(SIO <sub>2</sub> )	7.9	7.0	7.3	6.9	8.9	7.0	7.1	9.7	8.5	7.4	8.8	8.8
	Mean	discharge (cfs)	657				1060	2290	2580	966	933	1510	902	200
		Date of collection		Nov. 28	Dec. 20	Jan. 29, 1963		Mar. 28	Apr. 29	May 23	June 19	July 31	Aug. 29	Sept. 24

### 3-5195. LITTLE TENNESSEE RIVER AT MCGHEE, TENN.

LOCATION. -- Temperature recorder at gaging station at mouth of Tellitoo River, 100 feet upstream from builden on U.S. Highway 411, 0.3 mile upstream from Louisville and Nashville Railroad bridge, and 0.5 mile south of McGhee, Monroe County.

DRAINGE AREA. -- 2, 443 square miles, including that of Tellitoo River.

RECORDS AVAILABLE. -- Water temperatures; June 1960 to September 1962, unpublished, October 1962 to September 1963.

REMARIS. -- Records furnished by Tennessee Valley Authority.

Temperature  $(^{\circ}P)$  of water, water year October 1962 to September 1963 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermography

	Aver-	age	62	5.8	50	44	45	0 4	5.2	5.5	48	6.0	11	2 4
	₹		62	1 1	47	7 7 7	11	4.0	11	57	11	2.5	4.6	11
		31												
		30	61	5 54	47	4 0 7 0 7 0 0 7 0 0 0 0 0 0 0 0 0 0 0 0	11	5.5	4 1 1	5.57	9 60	1 61	4 6 4	4 6
		29	61	55	4 4 8 8	77	11	ر 1	r r 6 €	8.70	2.4	- 13	64	44
		88	60	44	4 4	4 4 2 2	47	€. c	5.5	55	η, η Ο, α	61	6.3	4 9
ў.		27	1.9	5.5	4 4	11	41	c, r,	52	55	R 10	00 a	11	5. 5.
gra		97	6.7 6.1	5.5	4 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	11	42	0.0	5.1	55	υν. 60 00	0 0	11	A 4 4
Sirie Bi		25	63	55	4 4	11	47	n. n.	52	5.5	5.8	ر. و د	1 1	5.4
ğ		24	62	5. 4.	4 8 4 8	11	4 1 4 1	50	53	5.5 5.5	5.0	η. η Ο G	11	6.3
ted		23	6.4	5.6	4.9	11	45	50.	رد رم دد رم	л. 67.	5.0	000	11	64
ctua		22	4 K 9	57	50	4.6	4.7	51	53	5.6	58	61	11	59 94
-8		21	64	57 57	50	4 4 5 5	4 2	52	10. 10. 10. 10.	5.6	58	61		65
op o		20	64	57	6 7 6 7	4 4 5 7	47	5.2	52	9,58	57	60	1 1	65
ethyl alcohol-actuated thermogragh)		19	63	57	64	45	42	54	52.52	5.6 5.6	57	09.5	1 1	64
thy1		18	63	58	5 <b>4</b> 8 <b>7</b>	2 4 5 5	42	53	52	5 S	59	60	11	64
s e		17	64 64	5.8	4 4 0 0	4 4 70 70	42	F.3	50	50	9 y	50	1.1	54 54
non	Day	91	63	5.8	2 4	4 4 5 5	4.5	5.2	53	5 t	5 E	60	11	44
댪		15	5.4	5.6	4 7	4 4 5 6	4 2	بر بر 5 ر	5.5	55	я. 9. ж	61	11	63
ទ		14	40	5.6	67	46	t 23	e r	1.5	5 th	7 2	0.0	11	52
temperature attachment, continuous		13	54	5.8	0 4 0 0	4 4	43	1. c	5.2	7 A	2 g	0,0	62	44
ch B		12	4,6	5 F	5.0	-13	643	r 4	67 -	ς. ς.	0 c	C C	6.5	64
atte		=	63	59	51	4 4	4 4	4 4	5.2	ας 56	50	50	62	64
ire		10	6.3	0.00	51	47	5 2 3	4 4	5.7	5 t	69	C &	61	54
rate		6	63	6 g	5.2	4 4	7 7	4 7	r r.	л д 4	A 40	60	63	63
mbe		8	64	50	52	44	77	11	5.5	54	59	60	62	465
t t		7	4 6 9	59	5.7	4 4	4 4	1 1	η. η. ζ -	5.5 4.0	57	oα	62	5,2
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der		2	3.6	60	5.5	4 4	6.7	4 4	4 0	5.5 5.4	5.5	62	H	4 4
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8		3	44	6.1	5.5	4 4	6 7	77	4 4	n n.	n n	0 0	11	4 6 4
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		-	5.2	, ç	54	4 t	5.5	64	40	52	5.7	٠, د د ه	11	4 6
Ì			- ::	11	11	11	; ;	1 1	11	; ;	11		11	1:
	Month	MACHICII	October Maximum Minimum	= =	Maximum Minimum	January Maximum Minimum	83	mnm	April Maximum Minimum	Maximum .	cimum imum		Minimum	

TENN. 3-5280, CLINCH RIVER ABOVE TAZEWELL, LOCATION. --Temperature recorder at gaging station, 0.4 mile upstream from Grisson Island, 4.6 miles downstream from Big War Creek, DRAINGS east of Traxwell. Clainorne County.

DRAINGS ass of Traxwell. Clainorne County.

RECORDS ANAILABLE. -- Water temperatures: Marriet to September 1962, unpublished; October 1962 to September 1963.

EXTREMES 1962-63. -- Water temperatures: Marriam, 64°F Aug. 24, 26; minhims, freezing point on many days during December to

February.

REMARKS. -- Records furnished by Tennessee Valley Authority.

Temperature (°F) of water, water year October 1962 to September 1963

	-		Ē	ecor	der	TA .	Ę.	embe	with temperature	ure	atti	ch.	ent,	8	ıtir	non	(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)	hyl	al.	oho	l-ac	1-actuated	ed	ther	Sout	raph					İ	
Menth																Day																Aver-
MORE	-	2	က	4	2	9	7	8	6	2	=	12	13	14	15	91	17	18	19	20	21	22	23	24	25	56	27	28	29	30	33	age
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Maximum		r 4	E. F.	c 4	4 7	4 4	4 7 4 7	4 5	4 7	4 4 0 a	7 ¢	4 4 0 0	4 4 8 8	2 4 4	4 4	4 8 7 7 4	50	64	4 4	6 8	6 7 8 7	0.4	0, 10	4 4 7	L 4 4	4 4	4 5	9 7	45	45	11	49
Maximum	44	4 4 C V	44	1 4 4 6	44	39	40	0.0	9.6	36	3.2	32	86	32	3.5	35	33	4.6	60 62	3.5	36	3.6	6 c.	0 10	3 au	0 00	4 5	4.7	43	4 2 4 1	35	38
January Maximum Minimum	.:	٠. e.	3.5	2 4 4	34	4.0	2,6	2 E	2.7	200	46	4 4 7 7	2 2	4 4	0 ¥	3 4 4	к с 4	4.5	2 4	4.0	4 w	0.00	w. w.	6 G	4 4 61 61	6 t	6. W	5.5	C) C	6. t.	5 (1	2 & 4 6 & 4
Maximum	3 %	3.6	5 4	4.	94	6 c	40	4 D	4 1	0 t	40	0 a	38	75	2.4	32	3.5	35	3.6	37	35	00 u	34	36	50 t	3.7	ا د د	2 4	11	11	1.1	37
Maximum	e. e.	2 t 8	4 to	4 5 C 4	4 5 4 2	4 4 6 6	46	4 4	4 4 5 4 5	46	46	4 4	4 4	R.O	0 4 0 4	50	52	52	52	5.5	0 7	4 4 7	7 4 4	8 4	47	6.0	5.5	55	α. η. α. 4	5.0	57	49
April Maximum Minimum	.:	6.5	61	67	63	6 c	57	5.5	51	53	5.8	57	e. e.	0.9	53	P 6	5 2	5.0	65	69	53	71	70	6 4 9	66	6.18	5 1 5	2.6	6 1 6	66	11	49
Maximum	61	5 2 2	4 82	6.5 0.0	67	71	4.4	47.	76	7.1	7.3	75	74	7.0	11	11	11	1.1	1 }	11	1 1	11	70	70	68	6.5	6 6 5 5	5 4 4	999	5.5	5.6 5.5	11
Maximum	. : 6 %	C 83	11	11	11	11	1.1	11	+ +	11	- 1 1	11	11	11	11	11	11	11	1.1	11	11	1.1	1 1	11	11	14	11	11	11	11	11	11
July Maximum Minimum	11	_ 11	11	11	11	11	11	1.1	11	1.1	1.1	1.1	11	11	11	11	11	1 1	1.1	11	1.1	11	1 1	11	1 1	11	1.1	11	1:	11	1:	1.1
Maximum	11	11	11	1.1	11	11	11	11	1.1	4 %	81	7,6	8 78	0 K	74	7.9	20	17	81	77	27	90	22	34	8 3	9.4	703	4 67	79	77	77	1 1
Maximum	81	79	81	81 7.8	7.8	47	380	7.9	79	81	877	7.5	77	7.7	78	80	72	74	76	78	902	11	11	11	27.5	7.3	73	65	7.1	7.1	1 1	77

3-5320. POWELL RIVER NEAR ARTHUR, TENN.

LOCATION. --Temperature recorder at gaging station, 500 feet upstream from bridge on U.S. Highway 25E, 2.3 miles east of Arthur, DRAINAGE AREA. --668 square miles.

DRAINAGE AREA. --668 square miles.

EXTREMES, 1962-93. -- Maret temperatures: October 1962 to September 1963.

EXTREMES, 1962-93. -- Maret temperatures: Maximum, 61°F July 2-5, Aug. 3-6; minimum, freezing point on several days during.

December 7. February.

REMARS. -- Records furnished by Tennessee Valley Authority.

1963	thermograph)	
1962 to September	Q	
Temperature (°F) of water, water year October 1962 to September	(Recorder with temperature attachment, continuous ethyl alcohol-actuate	

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40 43 39 40 4C		44	44	47	47	44	47	8 9	4 8 2	200	0 0 0	50 5	51 5	0.10	53.5	52	52 5	51	4 4 6 4	42	8 7 7 7	0 4	51.04	6.1	56 5	53	8 4	75	0 2 2	50
62 63 6 58 60 A	 6.5	652	5 8 8 8	5.6 5.6	60 55	\$ 5 C 8	0 8	561	57.5	5,4	80 R 80 R	80 K.	0.60	9 4 4	54 5	46	60 6	58	69 7	7.1	9 5 6	666	65	9 9 9	65 65		501	0 1-		6.3
56 56 58	 Λα.	5 6 5	66	69	71	72	5.7	44.	76 70	- 69	71 7	72 7	72 7	72 -1	70 6	62	65 6	9.6	64 6	999	62 6	62	62 6	62 6	63	11	11	11	11	68 66
11	 1 1	11	11	11	11	1.1	11	11	+	11	11	11	11	11	11	11	11	11	11	11	11	11	11	478	78 7	7.	77 77	7 7 7 7 7 7 7 7 7 7 7 7 7	11	1.1
77 78 87 77	 W F-	91	81	76	72	72	47.0	6.00	75 7	929	7.3	76 7	7 0 7	75 7	78 7	77	7 4 6	929	71 7	44	75 7	22	4.0	76	- 67	77	75.7	7.5	7.2	76
78 80 8	 75	91	7.81	103	90	80	73	77	7.7	78	76 7	76 7	75 7	76 7	77 7	73	78 7	76	76 7	74	78 7	97	79 7	75	797	7.5	78 7	6 4	7.8	7 4 4
78 77 77 77 77 77 77 77	 78	7 5	78	77	76	77	77	77	77 7 7 7 7 7 7 9 7 9 7 9 7 9 7 9 7 9 7	4.6	747	70 07	74 7	75 7	75 7	72	73 7	72 67	73 7	7.2	69	6.2	66	68	6 9 4 6	6.6	63	63	11	73

3-5382.25. POPLAR CREEK NEAR OAK RIDGE, TENN.

LOCATION.—"Temperature recorder at gaging station, 1,000 feet upstream from county bridge, 0.4 mile downstream from Indian Creek, and L. 2 miles northwest of intersection of State Highway 95 and Anderson County line in Oak Ridge.

DRAINGE AREA, square miles:

EXTREMES, 1962-63.—"Rater temperatures: June 1961 to September 1963.

EXTREMES, 1962-63.—"Rater temperatures: Maximum, 75°F Aug. 5-9; minimum, 33°F Dec. 14-17.

REMARKS, 1962-63.—"Rater temperatures: Maximum, 76°F Aug. 5-9; minimum, 33°F Dec. 14-17, 1962.

REMARKS.—Recorder stopped Apr. 3 to May 28, June 15 to July 29, July 29 to Aug. 1, Aug. 22-28, and Sept. 3-30.

Temperature (°F) of water, water year October 1962 to September 1963

1			1			[	ĺ									Day				1												Aver-
Month	<u> -</u>	2	6	4	က	9	r-	∞	6	으	=	12	23	14	15	92	17	22	19	20	12	22	23	24	25	56	27	82	59	30	31	age
October Maximum Minimum	. c c	60	44 62	44 64	6.2 6.2	4 40	٠ ٠ ٢	\$ \$ \$ \$	4 & 4 R	ر ب 1 م	5 4 4 4	4 4 4	α. φ. π. π.	ν. ν.	68	8 6	67	53	63	4 A C Q	60	61	6 4	υ.υ. 60 (υ.	5 T	t 3 t 3	4 4	4 7	53	. v. v.		61
Maximum	55	52	11	5.1	. r. 0	η 4 C α	4 6	4 4	1. 4.0	7 7 U W	54	5.5	5.2	5.2	6 7	1 5 7	R. R.	53	53	5.2	53	E 57	52	50	51	51	50	4 8 4 6	r 4	52 50	11	5.2
Maximum	€ 4 C 80	α 9 4 t	4 5	r 4 7 4	47	4 2 4 2	4 4	4 4	4 4 C O	240	3 3	€ E	2.6	0 F	8.6	u u.	4 6	3.6	3.8	3 6	4 1	4 4	44	39	9.6	4 4 0 4	4.3	4 4 8	44	4 4 9	£ 0,4	4 4
January Maximum Minimum	4 6	0 00	e. c.	3.9	30	4 4 V C	4 2 4 2	4 2	4.4	4 4	4 4	a a 4 4	4 4	4 k	3.8	3.6	w w m x	27	4 4 0 3	2 4	4 4 4	9 %	6) E.	8.6	60 K	9 4	3.8	e 6	2.4	4. 4.	36	3.0
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Maximum	44	7 6	4 4	4 4	4 6	2 4 0 a	4 4	4 4	4 4	50	رد 4 م	ς ς C C	n 4.	2 g	η 4 α	n C.	A. C.	5.2	5.5 5.2	A A.	4 4	4 4	0 4	52	5.2	4.4	ر 13	57	5.7	5.5	1.6	5.54
April Maximum Minimum	۲. ۵	6.5	44	11	11	11	11	1 1	- 11	- } !	11	1+		1-1	11	- [ ]	1 }	11		11	1 }	- 11	-	11	11	- 11	- 11	11		- 11	- 11	1 1
Maximum	11	11	11	11	11	11	11	1 1		1.1	11	11	11	11	- 1 1	11	11	11	11	11	11	11	- 1-1	11	+ 1	11		11	63	65	8.9	- 1-1
Maximum	68	68	4 4	5 4 A	4 4	4. 4. 0. 4)	α. α	40 4 60 0	6 8	72	72	7.2	7 2	7.1	1.1	11	1.1	11	1.1	1.1	11	11	1 1	11	11	11	1 1		1 1	1.1	! !	11
July Maximum Minimum August Maximum Minimum	11 11	11 66	74 72 72 72	47 72 47 47	72 75 25	72 77 84	5 5 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7	77 20 77 20	5.5 7.7 7.5	68 66 77	67 66 72 71	67 27 73	67 67 73	58 7.7 7.2 7.2	7 4 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	54 F4	69 59 72	70 69 73	72 70 72 72 72 72	72 71 72 72 72 72 72 72 72 72 72 72 72 72 72	72 70 72 72 72	77 70 72 77 77 77 77 77 77 77 77 77 77 77 77	76 70 74 72	74 68	68	68 11	69	122	11 42	73	73	0 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
September Maximum Minimum	5.4	F 4	4 6	11	11	11	; ;	11	-11	-	11	11	1.1	1.1	11	11	11	11	11	11	11	11	- 1 1	11	11	11	1.1	11	-11	1.1	: :	11

3-5382.5. EAST FORK POPLAR CREEK NEAR OAK RIDGE, TENN.

LOCATION .—Temperature recorder at gaging station, on county road bridge, 0.3 mile north of State Highway 95, 1.7 miles upstream PRATOM Bear Creek, and 2.8 miles southwas for intersection of State Highway 99 and Anderson County line in Oak Ridge.
DRAINGE AREA.—13.5 square miles.

EXTREMES AREA.—13.5 square miles.

EXTREMES 1.962-63.—Where temperatures: Maximum, 75° July 3; minimum, 35° Poc. 13.

FEMTERS. 1962-63.—Where temperatures: Maximum, 75° July 16, 1962; minimum, 35° Poc. 13, 1962.

FEMTERS. 1962-63.—Where temperatures: Maximum, 75° July 16, 1962; minimum, 35° Poc. 13, 1962.

Temperature (°F) of water, water year October 1962 to September 1963

	-1	ا يو	1			0.5			~-					
	Aver-	age	64	5.55	4 4 5	4 4 9 9	4 4 2 4 4	50	63	6 4	70	7.1	11	69 68
		31	60 5.8	11	4 4 6 4	4 4 2 5	11	64	11	6,4	11	73	11	11
		30	960	5.4	4 4	4 4 2 3	11	ют. 6. в	5.0	67	73	73	11	66
1		29	9.0	5.5	4 4	4 g	H	61	61	66 65	23	72	11	56 66
		28	56	54	t t	9.6	4 4	58	61	6.5	73	72	11	99
_		27	4 4	53	t 4 6	4 4 0	4.0	5.0	5.9	\$ \$ \$ \$	72	71	11	66
thermograph		26	54	54	4 4	3.9	t t	5.0	59	63	72	202	11	63
Mon.		25	5.4	53	4 2	9 6	4.5	55	62	63	72	71	11	63
ther		24	58	53	47	3.6 2.8 3.8	4 4 0	55	6.5	63	73	71	11	66
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trat		22	61	54	52	4 4	3.8	5.6	69	66 64	27	72	11	70
alcohol-actuated		21	4 6	57	52	7 4	44	800	63	67 66	71	73	1.1	70
oho		20	62	4 c c	4 8	4 4 7 0	4 5	52	67 64	67	71	73	11	69 68
a 1c		61	63	e. e.	4 6	4 4 7 4	43	. 4 4	66	65	7.0	27	11	68
ethyl		22	66 63	5.5	4.5	47	413	57	66	69	6.0 0.00	73	11	40
		12	68	5.R	4 4 4 4 4	4 4 2	40	57	4 8	5 A A	4 4 0 6	17	1.1	0 6
non	Day	92	68	5.4	4 4	4 13	39	5.1	eo r.	6.8	6.4	717	11	40
continuous		15	6.7	4 5	4 4	4 4 7 1	4 0 4	€ 4 € 8	ν. η 0. 4	58 66	17	71	11	7.0
8		41	68	5.5	47	4 4	42	54	2, 3,	4. A. A.	7 69	70		17.
i,		E	68	n n n n	5 t	r 4	7 7	4 0	50.4	8 4	7.0	4.4	11	7,1
chm		12	67	4 A	9.6	4 0	4 4	4 4	5.2 R.R.	۲- 4 ۲- 5	C 6	4.5	5.5	7.5
atta		=	66	7 4	3.0	63	4 4	4 4 7	50	7.3	7.0	62 4	7.0	7.2
re		2	α. <b>τ</b>	56	4 1	4 4	4 4	4 4 6 00	9 P	6.7	7,04	5.5	1.7	71
temperature attachment		6	69	n n	4 4 7 4	7 4	4 4 8 6	4 4	64	α. α.π	0 4	4 4	77	70
mpe		ω	69	م 4	4 7 4	4 4	4 4 C /	4 4	52	4. t	27	4 4 0 a	73	70 8.8
te		-	69	54	4 4	4 4	4 4	4 t	62	54	5.0	C 6	72	71
with		9	6,4	53	κ 4 Γ π	4 4	4 4	t 4	5.9	4.6	δ. κ 0. α	70	7.7	73
ler		က	57	4.40	5.5	47	4 5	50	4 0.	63	6.7	73	74	74
Recorder		4	67	ת ה ה	5.5	4 4 6 4	4 4 N W	4 4 5	67	6 g	A 7.	77	73	74
(Re		8	57	4 4	r 4	1 1	4 2	44	5.5	ζ. ñ.	6.8	75	7.2	; ;
		7	67 66	и ц п 4	52	4 4 4	4 5 7 2	4 4	66 61	η. η. α. Α.	64	747	72	11
ļ		_	69	n n	512	4 4	4.5	4 4	5 6 7	0. 1c 0. 4c	999	7 2 4 7 7 2 4	7.2	1 1
	44	Month	October Maximum Minimum	Maximum	Maximum	January Maximum Minimum	Maximum	Maximum Minimum	April Maximum Minimum	Maximum	Minimum	July Maximum Minimum	Minimum	Maximum

3-5382.75. BEAR CREEK NEAR OAK RIDGE, TENN.

LOCATION.—-Temperature recorder at gaging station on county hridge, 200 feet west of State Highway 95, 0.8 mile upstream from mouth, and 3.9 miles southwest of intersection of State Highway 95 and Anderson County line in Oak Ridge.

DRAINAGE AREA.—-7.2 square miles.

RECORDS VALIABLE.—Water emperatures: October 1961 to September 1963.

EXTREMES, 1962-63.—Water temperatures: Maximum, 70°F June 14, July 3, 4; minimum, 35°F Jan, 24.

EXTREMES, 1962-63.—Water temperatures: Maximum, 71°F Anne 14, July 3, 4; minimum, 33°F Jan, 11, 119, 1962.

Temperature (°F) of water, water year October 1962 to September 1963 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)

			Tecorner	3	1	T A		1	2	cemperarme accaciment	2	Ĭ	,	;	-	2000			1		1	arconor-accasted chormograph.	,		1							
Month																Day																Aver
MOREI	1	2	3	4	r.	9	-	8	6	10	Ξ	12	13	14	15	16	11	18	61	20	21	22	23	24	25	26	27	28	59	30	31	age
October Maximum Minimum	59	62	5.2	63	59	62	53	A 40		63 59	63	63	63	44	64	64	62	52	5.0	5.5	60	60 56	58	55	51	50	4 4 0 m	2.4	5.5	56	56	60
Maximum Minimum	54	51	52	52	52	0 4	4 4 4 7	50	4.c.	4.6	53	5 4	5.2	0, 4 0, 4	51	5.3	5 T	53	52	0.4	52	5.5	4 4	2 4 2 4	6.9	50	t t	51	52		. 11	51
Maximum	t t	44	4.3	5.0	50	4 7	4 4	44	4 4 7 7	4 2 8 8 8	96	4.5	36	3.5	3.7	4 80	4 3	4.1	44	t 4	48	4 4 6	4 4	4 t	46	4 4	1 4 0 4	4 4 5	4 4 6 6	4 4	3 4	4 4
January Maximum Minimum	t 1 1	2 4 C C	4 7	4.0 4.0	44	4 4 4 4	4 4	4 4	4.5	4 4	4.5	η. 4 C α	4 4	4 c	3.8	9.40	37	4 t 0 3	4 4 6 4 9 9	3 6	4 6 6 6 9	4 k	3.8	8.8	35	37	3 4 0 80	8 %	30	39	4 4	4 2 4 0
Maximum	4 4	64	4104	t t 0	44 6 7	4 1	4 4	4 4	4.3	4 4	4 4	4 4	4 t 2 8	7 7 7	39	3.6	41	4.2	4.2	3.8	42	37	37	4 4	45	4.5	41	<b>1</b> 0 1	11	11	1 1	40
Maximum	1 1 1 1	9 4	4 1 4 1	4 4 7 7	4 6	4 4	44	4 4 0 4	47	4.5	4 4 2, c	7 4 7 ¢	4 9	r 3	52	52	57	50	57	5.5	53	4 9	4 4	50	5.5	5. c.	5.5	5.6	62	64 56	5.5	6.6
April Maximum Minimum	400	49	66	400	50	n, n on	55	6.2 5.4	63 F.B	62 55	62 56	5 4 5	60	8 r	50	80 LZ	4 9 4 9	46	64	67 61	67 58	63	68	5.5	5.8	5 6 2	57	59	9.4	59	11	62
Maximum Minimum	€. 4 4	5.2	5.5	63	5.5	6 6 8 8	66 5.8	5.0	69	69	6.4	67	67	66	6.6 5.2	63	67	65	67	65	64	64 60	58	5.8	62	62	6.3	65	64	67	62	65
Maximum Minimum	67 64	63	66	6.5	64	67	67	6 4 7 4	6.4	5.4	. v	67	6.6	70	69	68 6.6	66 64	9 4	65	66 7.	6.6	6.5	66	67	67	A A	5.07	67	67	68	11	64
July Maximum Minimum	6.0	6.60	7 C	10	69	£ 4	67	5.4	5.4 5.4	9 1 9	65 61	6.5	63	54	4. 4. 8. 4.	68 55	55	6 ¢	68	68 67	5 6 6 6	6 4 4	67	67	67	τ ν. α. ν.	7.0	65	5.5	69	6.8	65
Maximum	65 66	6.4 6.4	A 4	5 9 6 5	69	8 4 6 4	69	6.7	6.4	56	4.6	7 4	66	54	5.4	5.2	63	6.6 6.5	63	67 66	67 66	66 66	66	66	69	6.9	68	6.8	68	67	65	65
Maximum	99 94	66	69	68	69	5 8 7 8	64	9.9	5.4 5.4	64	68	68 66	68	6.5 5.5	67	68 65	64	9 4 9	66	66	63	65	65	58	61 56	63	62	63	64	61		999

#### TENNESSEE RIVER BASIN--Continued

#### 3-5500. VALLEY RIVER AT TOMOTLA, N. C.

LOCATION (revised).—Temperature recorder at gaging station at bridge on Secondary Road 1373 at Tomotia, Cherokee County, 0.2 mile upstream from Rogers Creek, and 47 miles northeast of Murphy.

DRAINAGE ARRA.—104 square miles.

RACORON SAMIALABLE.—Chemical analyses: October 1952 to September 1953.

Water temperatures: October 1952 to September 1953, October 1961 to September 1963.

EXTREMES, 1962-63.—Water temperatures: Maximum, 72°F Aug. 7, 8; minimum, freezing point Dec. 12-16, 1961-65.—Water temperatures: Maximum, 74°F on several days in July, August 1953, and July 1962; minimum, freezing point Dec. 12-16, 1961-63.—Water temperatures: Maximum, 74°F on several days in July, August 1953, and July 1962; minimum, freezing point Dec. 12-16, 1962.

		Chei	mical ar	alyses	in par	rts per m	illion	, water	year Oct	Chemical analyses, in parts per million, water year October 1962 to September 1963	to Sep	tember	1963					
	Mean	1,00	Į.	Cal-	Mag-	Sodium	Po-	Bicar-		Chloride	Fluo-	, i N	Dissolved	Hardnes as CaCC	Ss S	pecific anduct-		
Date of collection	discharge ((cfs)	SiO <sub>2</sub> )	(Fe) Clum	clum (Ca)	stum (Mg)	(Na)	Stum (K)	bonate (HCO <sub>3</sub> )	(30°)	(C1) (F) (NO <sub>3</sub> ) at 180°C) magne-carbon mhos at 25°C)	ride (F)	trate (NO <sub>3</sub> )	(residue at 180°C)	Calcium, N magne-car stum	lon- rbon-	nicro- mhos 25°C)	<u> </u>	pH Color
Oct. 8, 1962		6.9	104 6.9 0.01 6.4 1.4	6.4	1.4	1.6	8.	24	3.6		0.4 0.0 0.4	0.4	A34	22	2	45	7.0	20
May 10, 1963		8.9	00.	3.2	1.1	8.	ī.	16	1.0		۰.	.7		12	0	30	7.2	3
A Calculated from determined constituents.	etermined c	constitu	uents.															

3-5500, VALLEY RIVER AT TOMOTLA, N. C. --Continued

Aver-	age	5 8 5 8	47	38	40	4139	51	5.8	63	65	8 9 9	69	9 4
4													
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	3	50	50	\$17	39	11	200	57	61	62	8 9	64	63
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	27	4 4	4 4 7 7	£ 3 £ 3	38	41 35	54	56	58	66	63	7.1	63
	56	4 5	4 6 6 4 3	£ 7 7	8 8 4	475	53	5.5	58	999	6.5	20	59
	22	50	47	41	3.3	38	51	5.00	62 59	67	66	69	57
	24	50.5	4 2 4 3	39	33	38	51	563	60	67	65	99	59
	23	57	43	39	38	38	6 4 9	64	63	99	8 4 9 4	66	66
	22	57	47	43	35	35	8 4 4	62	64	67	63	6.5	66
	12	57	47	43	39	43	50	59	64	65	67	68	99
	20	5.58	47	41	4 4	38	55	409	63	99	68	68	65
	61	61	0 4	37	4 1 4 3	38	50 50	0.80	6.1	6.5	68	69	63
	82	60	50	36	41	35	54	57	65	99	68	69	99
		62	209	36	35	36	5.5	5.28	65	66	6.5	65	66
Day	9	62	9 4	35	3.5	33	6.4	53	64	69	69	99	65
۳.	22	62	44 64	32	33	34	0.4	6.8	65	02	699	64	65
	41	9 9	t 4 4	32	36	36	52	55	64	68	6.5	6.5	6.5
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	21	2.80	9 4 5	33	8 7 4	43	52	5.58	6.3	71	64	65	67
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	2	2 63	64 84	34	37	39	9,	8 4	63	02 89	64	699	67
	6	63	4 2 4	38 3	40 4	43 4	45 4	5.5	65 6	65 6	68 6	71 6	67 6
	8	63	£ 4 2 7	35	39	44 4 6 4	84	9.5	65	99	8 9	72	65
	-	63	43 4	35	39.9	4 4 4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	5.5	59 6	67 6	67 6	72 7	67 6
	9	61	417	39	39	41	649	5.5	59	4 6 9	07 67	71	699
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	2												
	$\vdash$	57 60	52 48 48 46	48 45	37 36	43 43	38 42	53 54	56 55	62 62	69 69	69 69	68 67
	_		<i>w</i> 4										
Manak	Month	October Maximum Minimum	e -	December Maximum Minimum	January Maximum Minimum	mnm mnm	March Maximum Minimum	April Maximum Minimum	May Maximum Minimum	June Maximum Minimum	July Maximum Minimum		September Maximum Minimum

### 3-5710, SEQUATCHIE RIVER NEAR WHITWELL, TENN.

LOCATION.--Temperature recorder at gaging station, 15 feet downstream from highway bridge, 1.5 miles east of Whitwell, Marion County, 3 miles upstream from bridge on State Highway 27, and 4.5 miles domastream from Gridge on State Highway 27, and 4.5 miles domastream from Gridge or Creek.
DANIANGE AREA,--384 square miles (does not include 17.8 square miles in Grassy, Swaggerty, and Little Coves).
RECORDS ANAILABLE.--mater rememeratures: March to September 1962, unpublished; October 1962 to September 1963, EXTREMES, 1662-63. --Mater temperatures: Maximum, 78°F ully 5, 6, Aug. 26-28; minimum, 38°F Dec. 14, 15.
REMANS.--Records furnished by Temperse Nathority.

Temperature (?) of water, water year October 1962 to September 1963 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)

1	-Ja	age	6.4		9 in	ın ə	un et	11	61	63	7.1	7 7	24	r+ 6
	Aver	ल	63	11	4 4 5	4 4 5	44					72	7.5	7 1
		3	50.00	11	4 6	4.2	11	11	- 11	66	1.1	70	12.0	-11
-		စ္တ	4.6	53	4 4 6	410	11	1.1	17	65	73	70	73	66 49
		59	3.0	52	47	0 4	11	11	5.9	64	7.1	70	74	66
l		82	52	51	46	4 10	1 1	11	6 t	6.4	7.1	70	7.5	65
pp G		27	20	52	4 4	2.4	4 4	1.1	61	62	71	68 7	75	66
gra		56	5.5	52	4 4 6 E	t 1 0	4 4 6	11	59	62	69	5 4	73	63
thermograph)		25	30 E	52	46	4 4	4.5	11	5.2	62	69	67	74	69
		24	55	52	47	4 4	44	1.1	5.5	63	6.8	6.4	74	19
ated		23	61	5.2	47	44	42	1.1	67	64	68	71	73	69
ctm		22	63	3.4	44	4 4	t t	11	5 4 F R	99	40	7.1	27	71
01-a		22	46	5.5	4.5	47	4.5	1 1	6.6	66	71	7.5	7.7	77
alcohol-actuated		20	6 3	52	4 4 n.n	47	44	1.1	64 5.7	56 65	71	74	73	71
		19	6.5	5.2	44	4 4	43	1 1	63	67	7.1	74	73	71
ethy1		∞	5.5	53	4.2	3 6	42	1 1	6.0	6.9	70	74	72	71
	Ì	11	6.4	5,3	4 d	4 4	43	11	ر بر د بر	5.5 5.5	2.2	7.3	71	7.2
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attachment, continuous		12	7.94	52	6.6	4 4	44	1.1	5.6 6.6	5.6 4.4	72	74	70	70
ŏ		4	7.44	52	0 6	4 4 6 u	<b>4</b> 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1.1	0 1	5.3	77	73	71	7170
nent		13	5.6	52	14	ς γ C α	4.5	11	0.8	67	747	7.2	71	72
ach		12	5.6 5.4	52	4 4	C Q	4 4	11	5.8	67	74	7.3	71	73
		=	65	11	4 4 4	4 4	4 4	11	60 5.8	6,9	7.5	7.	71	73
ure		2	67	11	4 4 5	4 4	46	50	0 e	54	7.7	73	73	7.3
temperature		6	67	11	47	47	4 4 6 4		51	11	7.07	74	74	72
temp		80	609	11	47	4 7	4 4 0 0	1 1	a r	11	12 6	4.5	74	73
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		9	99	1.1	r r	\$ 4 \$ 4	4 2	11	9 4	11	7 Y	7 4 7	73	7 2
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Seco		4	65 65	11	5.2	1 1	t t	4 4	63	5.8	5. 6. 8. 9.	74	72	73
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Į		2	6.2	11	53	t t n n	4 4 5	_1.1	11	57	6.8	73	71	73
-		-		11	53	44	43	11	_ ! !	 8	5.5	. 17	70	73
	Month	Month	October Maximum Minimum November	Maximum	Maximum	January Maximum Minimum	Maximum	Maren Maximum Minimum	April Maximum Minimum	Maximum	June Maximum Minimum	July Maximum Minimum	Maximum	Maximum

### 3-5795, ELK RIVER AT ESTILL SPRINGS, TENN.

LOCATION.--Temperature recorder at gaging station, 250 feet upstream from bridge on U.S. Highway 41A, 400 feet downstream from Localsuile and Nashvilla Brailing Strucklin Strucklin County, 1.0 mile upstream from Town Creek, and 6.7 miles below Elk Rill Springs, Franklin County, 1.0 mile upstream from Town Creek, and 6.7 miles below Elk Rill Springs of the County, 1.0 mile upstream from Town Creek, and 6.7 miles below Elk Nature Miles.

RECORDS ANALLABLE.—An ter temperature: November 1960 to September 1962, unpublished; October 1962 to September 1963.

EXTRESS, 1962-6.—An ter temperature: Maximum, 82 Th Aug. 22, 23; miniaum, 36 Th Jan. 24, 25, 28, 29, Feb. 16.

Temperature (°F) of water, water year October 1962 to September 1963

															Da	Day															Aver-
	_	2	3	4	c.	9	7	8	6	의	=	12	13	14	12 16	J 91	17 18	61 8	9 20	21	22	23	1 24	1 25	26	2.2	28	29	30	31	age
11	6.5	46	5.5 4.5 4.5	4,6	5.5	45 45 45 45	44	ς. 6. Α.	c c	α. α.	8. t.	4.4.	6.6	64	70 70		69 67		65		56 65 65		64 62 62 59	55.	7 58	A.W.	2.5	20°C 08°C	50.7	C.0	9 9 2 F
11	η. η. α. Α.	r 4	r,7	ሌ ሌ ሌ	n n	7.4	5.5	5.2	η. φ. η. Ο.	r r	A 6.	4 4	0. 12 0. 0.	4.5	55 54		54 53		53 53		55 54		54 54 51 52		4 C C C C C C C C C C C C C C C C C C C	5.0	2.2	2.7	52	11	50.00
: :	50.00	51	5.1	53	52	6 4 9	r 4 6 7	8 7 4	4 4 6 n	2 4	44 7 7 4 7 7	4 6 8 6	9 6	7 7 8 4 4 4	43 45		4 2 4 6 4 3 4 3		46 47		47 43		43 42		43 43	4.2	444	4 2	4 4 W 53	43	4 4 6
11	4 1	3 4	, 4 0 4	, 4 , 0	540	4 4 C . L	4 4 2 2	4.7	4 t	9 4	4 4 4 4	7 7 7	7 7 7	4 6	41 42 39		4 2 4 3 4 5 4 5		44 44		41 43		38 38		36 38	2 10	3.38	3.9	33	38	4 0 0 4
11	38	0.00	2 g c 2 7 c	8 6 7	37	4 J	9.0	9.0	0 a	140	100	0 8 8	41 4	4	37 36		41 41 37 39		41 42 38 38		18 40	37	1 4 1 7 9 9	4 4	2 4 6	4 ,	4 4	11	1.1	11	38
11	4 t	4 5	4.4	47	7 t 4 t 4 t 4 t 4 t 4 t 4 t 4 t 4 t 4 t	7 7 7	4 7	44	4 4	4 4 x c	46.5	C C	300	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	53 54		R R R R R R R R R R R R R R R R R R R		57 56		55 55 57 51		57 56 52 52	5.45	7 4	5.2	4 4	at c	2.5	13	4.9
pril Maximum Minimum	6.4	7 4	A R.	ر بر د بر	η η Θ ε	5.5	g 4 4	ac a.	0 u	g 4 2 4	a t a t	- C 4	0.4	n n m n	58 60		60 61 58 58		61 63		59 60		65 40 58		61 64	6.53	9 62	£ £	2.2	-11	50
Maximum	62	4 6	6.3 6.0	44	ζп 6.0	40	9.54 0.8	45.0	450	4 6 6	707	7 2 7 7	72 4	84	71 72		72 71 68 65		72 72		72 71		58 55 64		66 65	65	5 6 0	60	κ. r.	949 97	7.4
11	64	49	6.1	62	17	73	7.1	7.5	76	7.5	72 7	50	7 9 7	75 7	75 74		71 70		71 72 69 71		72 68		67 69	7 7 6 8	1 72 8 70	7.0	3 75	75	75	11	72
11	74 5 f	74	77	77	7.8	1 1	11	11	11	11		11	11	1 L	1 1		11		11		11		11		- 11	11	11	11	11		11
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	7.5	73	77	75	75	7.5	74	75	7,0	75	76 7	7 4 7 2 7	75 72		73 73		73 74		74 73		73 73		72 70		67 68	9.	29	67	9 9	-	73

TENNESSEE RIVER BASIN--Continued

3-5820, ELK RIVER ABOVE FATETTEVILLE, TENN.

LOCATION. -- Temperature recorder at gaging station, 100 feet downstream from highway bridge, 1.8 miles southeast of Fayetteville, 4 miles upstream from Norris Creek. DRAINAGE AREA. -- 827 square miles. Lincoln County, and

June 1960 to September 1963. Maximum, 80?F Aug. 66, 27? minimum, 35°F Dec. 13-16. Maximum, 84°F Aug. 7, 8, 1960; minimum, 35°F Dec. 13-16, 1962. RECORDS AVAILABLE. -- Water temperatures: EXTREMES, 1962-63. -- Water temperatures: EXTREMES, 1960-63. -- Water temperatures:

3-5845. ELK RIVER NEAR PROSPECT, TENN.

LOCATION.—Temperature recorder at gaging station, 50 feet upstream from highway bridge, 1.1 miles downstream from Richland Creek, 3.2 miles east of Prospect, Giles County, 5.4 miles upstream from Ford Creek, and 7.9 miles upstream from Tennessee-Alabama Stata.—1.764 square miles.

RECORDS ARIAL—2.764 square miles.—The temperatures: October 1960 to September 1962, unpublished; October 1962 to September 1963.

EXTRESS, 1962—553.—Mater temperatures: Maximum, 78\* Aug. 6-13; minimum, 38 F Dec. 15, 16, 3nn. 27-29.

(00)

	Aver-	age	44	11	1 1	39	<b>4</b> 3	11	62	99	74	75	76	71
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		28	1.1	51	4 4	35	42	n, n, n 4	64	64 64	74	76	77	67
р		22	11	51	4 4 9 E	3.5	4 4 4	45	4 4	64 64	74	7.5	77	67
rap		26	11	52	4 4	36	4 4	5.4	9 t	6.4 6.4	74	27	7.7	67
rmo		25	11	ر <del>ب</del> ر	4 4	36	4 4	4 c.	4. 4. 6. 1.	66 66	74 74	76	77	68 7.4
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Temperature (°F) of water, water year October 1962 to September 1963 (Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)		53	4 4	1.1	11	4 4 0 u	43	11	4 4 C C	40	75 76	7 5	7.8	74
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TENNESSEE RIVER BASIN--Continued

3-5980. DUCK RIVER NEAR SHELBYVILLE, TENN.

LOCATION. --Temperature recorder at gaging station, 150 feet downstream from Sims Bridge, 2.1 miles upstream from Sugar Creek, 2.2 miles west of Shelbyville, Bedford County, and 2.9 miles downstream from Flat Creek.

October 1960 to September 1962, unpublished; October 1962 to September 1963. Maximum, 84°F Aug. 6-8; minimum, freezing point on several days during December and RECORDS AVAILABLE. -- Water temperatures: EXTREMES, 1962-63, -- Water temperatures: DRAINAGE AREA. -- 481 square miles.

January. REMARKS. -- Records furnished by Tennessee Valley Authority.

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3-6030. DUCK RIVER ABOVE HURRICANE MILLS, TENN.

LOCATION, --"Pemperature recorder at gaging station, 0.4 mile downstream from Tumbling Creek, 1.3 miles upstream from bridge on State Highway 13, and 3.6 miles southeast of Hurricane Mills, Humbneys County.

DALMNOR ARBA—2,557 square miles.

RECORDS ANAILABLE.—"Ret remperatures: October 1960 to September 1962, unpublished; October 1962 to September 1963.

BARNERES, 1962-63.—"Rate temperatures: Maximum, 87° Mug. 7; minimum, freezing point on several days during December and January.

REMARS.—Records furnished by Tennessee Valley Authority.

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April Maximum Minimum	66	6.8	α r.	58 66	67 64	6.2 6.2	63	6.0	63	47	99	62	65	64	5.4 6.0	61	2 4 2 4	69	69	70	73	74	44	0 2 0	67	10	5.6	. 4 4	4.6	4.6	11	6 4 4
Maximum	60	60 60	64	66	6.8 6.4	69	70	7.2	74	7.7	75	75	74	75	77	78	77	76	77	7.5	75	73	17	70	6 6 9	11	11	11	11	11	11	72
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July Maximum Minimum	11	11	1.1	1.1	11	8 C B	82	81	83	81	77	77	α ۲-	76	78	7 40	77	27.0	79	81	480	78	7.9	78	1 8 7	7.8	18	79	80.8	408	99.2	91 78
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### 3-6045. BUFFALO RIVER NEAR LOBELVILLE, TENN.

LOCATION.--Temperature recorder at gaging station, 30 feet upstream from Standing Rock Bridge, 1.4 miles downstream from State Highway 13, 3 miles north of Lobelville, Perry County, and 13 miles downstream from Cane Creek.

BECORDS NATIABLE.--707 square miles.

RECORDS NATIABLE.--Water temperatures: October 1960 to September 1962, unpublished; October 1962 to September 1963.

EXTREMES, 1962-53.--Water temperatures: Maximum, 86°7 kng. 7; minimum, freezing point on several days during December and January.

REMANES.--Records furnished by Temnessee Yalley Authority.

Temperature (°F) of water, water year October 1962 to September 1963 (Recorder with temperature attachment continuous attu alcohol-actuated than

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September Maximum Minimum	77	78	7.8	87.	79	79	77	77	78	70	79	77	75	73	71	75	757	76	75	75	75 7	75	73 7	5.2	717	44	68	69	00 4 00 4	9 %	11	75

#### OHIO RIVER MAIN STEM

3-6115. OHIO RIVER AT METROPOLIS, ILL.

LOCATION. --Temperature recorder at gaging station at Paducah and Illinois Railroad bridge at Metropolis, Massac County, 9.5 miles downstream from Tennessee River, and 37 miles upstream from mouth.

BADNIAMGE AREA. --203, 000 square miles, approximately.

RECORDS AVAILABLES. --Chemical analyses; October 1952 to September 1953.

Water temperatures: March 1954 to September 1967.

EXTREMES, 1994-63. --Water temperatures: Maximum, 84°F Aug. 5-10; minimum, freezing point Jan. 27 to Feb. 20.

EXTREMES, 1994-63. --Water temperatures: Maximum, 88°F Aug. 3-6, 1955; minimum, freezing point on Feb. 20-24, 1958, Jan. 27 to Feb. 20, 1963.

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#### 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, Pulaski County, 7,300 feet downstream from Bledsoe Creek, 18.5 miles downstream from gasen from Fennessee River.

DRAINAGE AREA -- 203,100 square miles.

RECORDS AVAILABLE. -- Chemical analyses. October 1954 to September 1963.

Water temperatures: October 1954 to September 1993.

FATERERS, 1962-63.—Specific conditorance: Maximum daily, 684 micrombos Nov. 16; minimum daily, 221 micrombos Mar. 23.

EXTREMES, 1962-63.—Specific conditorance: Maximum, 310 ppm Dec. 1-9, 1956, minimum, 228 ppm Mar. 11-20, 1955.

FATCHOSS, 1964-62.

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Chemical analyses, in parts per million, November 1962 to September 1963

		Color															
		Hg.	1	7.4	7.5	1	8.0	7.6	ł	7.3	7.1	1	7.2	7.3	ł	7.2	7.5
	Specific conduct-	(micro- mhos at 25°C)	504	684	320	283	322	244	310	336	265	349	379	316	260	350	221
tance)	Hardness as CaCO,	Non- carbon- ate	105	160	26	46	52	34	57	63	44	99	74	58	46	62	40
conduc	Hardness as CaCO,	Calcium, magne-sium	167	220	113	108	128	93	116	122	102	132	140	123	100	128	88
y specific	Dissolved	(residue at 180°C)	299	420	190	167	184	133	184	194	154	220	244	180	159	201	138
onth1	Ni-	trate (NO <sub>3</sub> )	5,6	8,9	3,1	3,5	4.3	2.6	4.8	5.1	4.6	0.9	8.9	5.0	2.5	2.9	2.6
inimum monthly	Fluo-	ride (F)	0.4	.7	°.	m.	m.	٦.	.2	'n.	۳ <b>.</b>	r.	2.	m.	7.	2.	۲.
daily samples and analyses based on maximum weekly, monthly, and minimum monthly specific conductance)	chi se i de	(C1)	45	99	26	18	18	14	19	22	14	20	23	18	15	30	12
ly, month	7,70	(3O°)	102	162	54	42	20	32	55	19	42	99	75	55	46	99	40
m week	Bicar-	bonate (HCO <sub>3</sub> )	76	74	70	92	92	72	72	72	70	8	80	8	99	80	28
maximo	Po-	stum (K)															
analyses based on maximum weekly, month	7	(Na)															
nalyses	Mag-	sium (Mg)	-	1	1	ł	{	1	1	!	1	1	1	ł	1	ł	1
s and a	Cal-	cium (Ca)	ł	1	1	1	!	ŀ	!	1	ł	1	1	1	ŀ	!	1
samples an		(Fe)															
daily		(SiO <sub>2</sub> )															
(Composites of	Mean	discharge (cfs)	182700	247000	198000	114900	141000	109000	191200	247000	135000	214600	243000	126000	846500	261000	1100000
(Con		Date of collection	Nov. 7-27, 1962	monthly)	monthly)	Dec. 4-24	monthly)	monthly)	Jan. 11-19, 1963	monthly)	monthly)	Feb. 3-12	monthly)	monthly)	Mar. 5-14, 23-31	monthly)	monthly)

t	7.6	7.3	1	9.7	7.4	1	7.3	7.3	7.4	7.3	7.0	7.1	7.2	6.9	7.1	6.9	
317	380	230	387	436	260	373	403	296	287	299	230	268	227	252	259	231	
99	64	42	99	87	30	64	69	20	-	44	31	34	56	ī	34	28	
144	156	06	159	187	104	143	156	117	1	121	06	106	8	1	100	88	
197	224	155	224	266	154	229	244	178	1	172	137	154	128	1	148	133	
5.4	4.9	4.7	4.6	4.0	2.3	3,5	4.8	4.4	ł	2.2	1.6	1.8	3.6	1	3.7	2.5	
2.		۲.	0.4	4.	e.	4.	۳.	۳.	1	!	1	1	1	1	1	ŀ	88). 88).
21	23	17	21	26	20	23	28	20	1	17	14	16	12	1	18	16	lfonate (Al lfonate (Al
28	67	43	62	74	33	64	68	46	44	44	30	38	30	31	33	27	zene su
96	112	58	114	122	06	96	106	82	1	94	72	88	20	1	80	74	alkyl ben alkyl ben
																	(PO, and 0.1 ppm alkyl benzene sulfonate (ABS) (PO, and 0.0 ppm alkyl benzene sulfonate (ABS)
1	1	1	1	1	1	1	1	ł	1	8.6	6.1	7.6	3.4	1	6.1	4.4	us (PO4)
ļ		1	1	1	1	1	!	1	1	34	56	30	. 28	1	30	28	ppm phosphorus
		_															d 0.16 ppm p
238100	190000	943000	192000	187000	193000	141900	171000	86300	95300	107000	117000	79100	79800	56400	75500	79200	te containe te containe
Apr. 1, 11-30, 1963.	monthly)	monthly)	May 1-31	may 22 (maximum monthly)	monthly)	June 1-30	monthly)	monthly)	July 17 (maximum weekly)a	monthly)	monthly)	Aug. 23 (maximum monthly)	monthly)	Sept. 30 (maximum weekly)b	monthly)	monthly)	a Sample for this date contained 0.16 ppm phosphorus b Sample for this date contained 0.17 ppm phosphorus

OHIO RIVER MAIN STEM -- Continued

3-6125. OHIO RIVER AT LOCK AND DAM 53, NEAR GRAND CHAIN, ILL .-- Continued

	Aver-	age	1	1	!	1	-	!	51	20	1	1	1
		31	- }	;	;	;	21	- 1	!	-	-	<u> </u>	-
		30	-	i	1	÷	43		22		1	-	7
		29	$-\dot{1}$	<u> </u>	1		44		55 5		_ <u>'</u>	+	72 7
		28 2	- 1	<u>:</u> 	<u> </u>	_	40		58		- <u>-</u>		77
		27	58	1		+	39	13.4	58	27 6		+	72 7
Į		56	65	<u>.</u>	<u> </u>		40		28	_	<u> </u>	_	
		25	50.5	-	<u> </u>		41	54 5	57 5	88	-	+	73
_		24	52	_	<u>.</u>	-	40		57	1	<u> </u>	<u> </u>	<u>.</u>
Temperature (°F) of water, November 1962 to September 1963		23 2	55 5	39 3	-		40		57 5	1	72 -	- 69	<u> </u>
er		22 2		_	_	_	÷					_	_
te		21 2	55 56		1	1	1	2	69 29	- 9	72 73	7 67	1
Sep		20 2		-		÷			_			_	
ţ		19 2	56 55	34	35 36	1	1	7	20 60	6 47	72 73		<u> </u>  -
962		18				_			_	_			
r 1		17 1		9 36	36 35	1	1	8	51 51	7 46	3 73		!
empe	Day			36	•	1	!			_		65	-
NOV	ŭ	91	58	37	36	1	Ļ		21	47	73		1
ì,		15		36	36	1	ł		21	_	63	1	1
wate		14	57		38		32	46	49	47	9		1
ų		13	57	!	37	-	38		49		-	-	!
£		12	80			34			<b>4</b> 8			ļ	i
9		Ξ	9	37	42	33	37		21	_	1	!	1
tur		10	62		!	36	37	ļ	20		_1	1	1
pera		6	52	<b>4</b>	1	32	36	_	44	48	1	1	62
Теш		8	61			33			44		1	1	63
		7	62	40	1	32	39	ŀ	44	49	_ !	i	1
		9	1_	45	ŀ	34	38	_1	44	49	1	1	1
		c	!	46	1	34	40		44	20	63	i	!
		4		46	1	33	ŀ	J	45	21	63	1	ŀ
		3	-	1	1	33	ŀ	ł	44	21	63	1	1
		2	_ 1	L	1	ŀ	ļ	- 1	44	22	62	ŀ	!
Ì		1	- 1	1	1	ŀ	1		44	1		i	1
	Month		November	December	January	February	March	April	May	June	July	August	September

## MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN

		Col-			10 m	വവ	7 8	നയ			മനമ	10	10 7 10 7			20 00	ភេព	ი 4
		bH C				6.9	7.3	7.3			7.4	6.9	7.5 7.7 8.0 7.0			6.4	5.6	6.5
	Specific conduct -	ance (micro- mhos at 25°C)			327	468	184	452 598			287 166 281	220	236 290 323 313			131	92	164
	Total	as as H+1																
		Non- carbon- ate			38	55 14	31	47			38 38 38	21	27 31 28 28			31	18	38
	Hardness as CaCO,	Cal- cium, magne- sium			71	92	57	106			117 62 110	06	103 131 141 144			37	23 23	63
63	Dissolved				174	266	152	353			175	128	138 170 190 186			80	65	153
ber 19		trate (NO <sub>3</sub> )			0.1	2.1	e. c	4.2			0.9 1.8 9.3	1.3	2.1	-		0.1	1.0	1.1
to September 1963		ride (F)			0.0	۰.۱	1 %				117,		अंचंबंबं				1.1	
r 1962 to		Chloride (C1)		PA.	59	95	25	91			9.4 5.0	6.5	12 12 12 12			3.0	3.0	7.5
in parts per million, water year October 1962		Sulfate (SO <sub>4</sub> )	STEM	ALLEGHENY RIVER NEAR KINZUA, 1	18	20	13	118	IN	FRENCH CREEK AT UTICA, PA.	37 27 26		78 38 38 78	NIN	COOKSBURG, PA.		52	
rater y		bicar- bonate (HCO <sub>3</sub> )	ER MAIN	ER NEAR	40	45 18	30	72	FRENCH CREEK BASIN	EK AT U	103 42 88	84	102 126 134 142	CLARION RIVER BASIN	r cooks	œ m	0 73	16 31
lion. v		tas- sium (K)	NY RIV	NY RIV	l	1.5	9.0	9.53	NCH CR	CH CRE	3.0.8	ů.	3.08	ION BI	RUN AT	1		2.5
per mil		Sodium (Na)	ALLEGHENY RIVER MAIN STEM		22	50	13	60	FRE	3-240. FREN	8.3 4.1 6.4	5.5	6.5 8.0 10 9.7	CLAS	3-294. TOMS	7.0	4.5	23
in parts	Mag-	ne - sium (Mg)		3-125.	4.4	5.8 1.9	1.2	6.3		3-5	7.8	4.9	8.08.8 8.08.8		e,			4. 0 0. 8
yses.	5	cium (Ca)			21 16	8.4	14	38			34 1 34	28	30 84 44 84 84			8.0	5.8 6.8	8.0
Chemical analyses.	Man-	ga- nese (Mn)			0.01		18	.03			0.02	8	8688				0.1	
Chemic		Iron (Fe)			0.01	8.1	18	000			0.0	8.	10.0.0.0			0.01	81	. 00
		inum (A1)																
		Silica (SiO <sub>2</sub> )			5.1	7.4	6.3	6.5			1.7	2.2	4.0.00			8.0	6.4	7.7
	Ves	eg B			1480	900	4250	505			240 3100 540	406	630 186 112 95			5.1	4.0	1.9
	3	of collection			Nov. 8, 1962	Feb. 20	May 2June 6	July 11 Sept. 19			Oct. 9, 1962 Nov. 13	y 9, 1963	June 11 July 25 Aug. 23 Sept. 26			v. 5, 1962	r. 4.	July 9
		ļ			No.	Fe Ap	A L	Se			& & Å	K K	Au Au Se			N G	Ma Ap	Se

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

		Col-			100	o ro	7	15	m m		יטינו	က	24
		Hq			9.0	9.0	9.9	6.4	7.0		6.7	5.0	4.4
	Total Specific	ance (micro- mhos at 25°C)			184	142	179	246	393		234	160	340
	Total	acid- ity as H <sup>+1</sup>											
	Hardness as CaCO <sub>s</sub>	Non- carbon- ate				38			109			47	
-	Hard as C	Cal- cium, magne- sium			55	45	51	80	87 117		69	52	109
Continue	Dissolved	solids (residue at 180°C)			116	98	105	163	274		143	91	199
1963	;	trate (NO <sub>3</sub> )			0.1		ů.	80	. r.		0.1	* œ	3.0
tember	i	ride (F)			0.1	٦.	I				0.0	1 23	.2
Chemical analyses, in parts per million, water year October 1962 to September 1963 Continued		Chloride (C1)		PA.	16	8 <del>1</del>	15	88	98		42.0	120	26
ctober 19		Sulfate (SO <sub>4</sub> )	ontinued	_	141	35.5	41	57	74	PINEY, PA.	51	4 4	103
year o	į	bonate (HCO <sub>3</sub> )	ASINC	R AT CO		္ <b>၈</b>			10	CLARION RIVER NEAR PINEY,		9	
water		tas- sium (K)	IVER E	N RIVE	1.2		1.0	2.0	2.0	N RIVE	1.6	# œ	1.7
million,		Sodium (Na)	CLARION RIVER BASIN Continued	3-295. CLARION RIVER AT COOKSBURG,	9.6	7.5	9.0	10	16 26			7.0	1
arts per	Mag-	ne- stum (Mg)		3-29	4.1	3.6	4.4	1.2	7.8	3-305.	5.1	0 <del>4</del>	10
d ar	3	ctum (Ca)			15	12	13	30	34		61 6	12	27
alyses	Man-	ga- nese (Mn)			0.02		1		.02		1	.0	- 1
ical a		Iron (Fe)			0.05	00.	1	60.			0.0	18	00
Chem		thum (A1)											1.3
		Silica (SiO <sub>2</sub> )			5.8	5.5	5.2	5.7	4.4. 4.10		5.2	4 80	5.1
	Moor	discharge (cfs)			978	400	7600	408	28e 268			1170	648
	i	of of collection			Nov. 5, 1962.	Mar. 4	Apr. 30	July 9	Aug. 13. Sept. 17.		Nov. 5, 1962	June 3	Aug. 12
								-	-1			-	•

### MONONGAHELA RIVER BASIN

3-500. TYGART VALLEY RIVER NEAR DAILEY, W. VA.

July 11, 1963. Sept. 20	15 9.5	3.0		0.03	0.00	12	1.5	2.5	1.1	44	4.0	1.5	0.0	0.3	53 46	37	100		83	8.2	
							3-507.		3 CREEK	K AT GI	LEADING CREEK AT GILMAN, W. VA.	ڼړ									
May 10, 1963	3.27	4.4		0.08				2.0		10	10 6.4	1.0		6.0	31	114	44	4 0.05	36	6.4	
						"	3-570. 1	3-570. TYGART VALLEY RIVER AT COLFAX,	LLEY R	IVER AT	COLFAX, W.	. va.									
May 9, 1963 July 9	410 625 935	444	6.0	0.19	818	10 8.4	0.51	1.8 3.5	6.6	0 43 17	30 30 39	4.0.5	100	2.0	81 65 65	8,8,8	364.8	0.38	130 87 108	5.5 5.5	000
						3.	-580. WE	3-580. WEST FORK RIVER AT BROWNSVILLE,	RIVER /	AT BROW	NSVILLE, W.	. va.						1			
May 9, 1963	23	4.3		0.05	0.00	24	7.1	4.3		24	48 79	5.0	0.2	0.3	163	50 89	30	30 0.17 75	138	7.0	5
							3-582.	3-582. STONECOAL CREEK AT WESTON,	AL CRE	EK AT W	*	va.									
May 9, 1963	A1.8	4.9		0.01	0.08	56	14	8.4		0	126 204	12	0.1	0.1	324	129	125	125 0.00 198	332	4.8	e .
						÷	3-585. WE	WEST FORK	RIVER AT	AT BUTC	BUTCHERVILLE, W	W. VA.									
May 9, 1963	441	4.5	0.1	0.02	0.00	34	9.2	8.2	2.8	23	81 106	8.0	0.2	3.0	194	123	104	0.11	311	6.3	9
							3-590. WEST	YEST FORK	FORK RIVER	AT	CLARKSBURG, W.	VA.									
May 9, 1963	87	5,1	0.1	.0 10.0	0.00	55	15	13	3,1	37	199	3.3	0.2	1.2	298	208	187	0.00	441	9.9	
A Estimated.			1																		

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

		Col- or
		Hq
	Specific conduct-	ance (micro- mhos at 25°C)
	-souc	us as PO
	ness aCO <sub>3</sub>	Non- carbon- ate
77	Hard as C	Cal- cium, magne- sium
-Continue	Dissolved	solids (residue at 180°C)
1963	ž	trate (NO <sub>3</sub> )
tember	í	ride (F)
Chemical analyses, in parts per million, water year October 1962 to September 1963 Continued		Chloride Fiuo- NI- solids Cal- Non- us micro- pH Col- (Cl) (F) (NO <sub>2</sub> ) at 180 °C) meigme. at mpos at sium.
October 19		Silica Anua   Fron   Ga - Cium   Fron   Ga - Cium   Fron   Ga - Cium   Fron   Ga   Cium   Fron   Ga   Cium   Fron   Ga   Cium
: year	ï	bonate (HCO <sub>3</sub> )
, wate	Pot-	tas- sium (K)
r million		Sodium (Na)
rts pe	Mag-	ne- sium (Mg)
, in pa		clum (Ca)
nalyses	Man-	ga- nese (Mn)
itcal a		Iron (Fe)
Chen		inum (Al)
		Silica (SiO <sub>2</sub> )
	, in	discharge (cfs)
	i	Date of collection

ASINContinued	
RIVER B	
MONONGAHELA	

						•	0 . /60-0	T NOCATE I	IN WEST	MEALON	3-39/. SIMPSON CREEN AI MENLOWDENOR, W. YA.	Υu.									
May 9, 1963		30	23	34	7.8	158	14	109	3.6	00	1390	30	6.0	1.8	1620	792 565	792 (	0.08	2660 2270	3.0	l ro
						.,	3-610. ₩]	WEST FORK RIVER AT	RIVER .	AT ENTE	ENTERPRISE, W.	. vA.									
May 9, 1963 July 12.	208 60 158	20	16 .5	11.6 .91	6.3	206 139	1884	58 112 62	1.4.4	000	690 1060 690	01 11 11.8 1.3	1 6.8	1.1	1670 970	482 774 510	482 (774 510	0.01	1440 2300 1470	8.0.8 8.0.8	2
							3-621.	3-621. PAW PAW C	REEK N	EAR RIV	CREEK NEAR RIVESVILLE,	W. VA.									
May 8, 1963 Sept. 19	3.08	59	0.5	0.14	19	318	150	222 893	5.4	127	639 3520	78 187	1.8	0.4	5310	380 1410	276 ( 1410	0.05	1630	6.6	
							3-625.	3-625. DECKERS CREEK AT MORGANTOWN,	REEK A	T MORGA	NTOWN, W.	W. VA.									
May 8, 1963 Sept. 20	320	19	4.0	0.02	2.0	116	36	38.	4.1	00	165 578	6.0	2.5	0.2	906	137	137 (436	0.03	402	4.3	
							3-62	3-626.5. SCOTT RUN AT OSAGE, W.	TT RUN .	AT OSAG	E, W. VA.										
May 8, 1963 Sept. 20	2.89	94	75	88 420	0.81	388	139	125 245	4.6	00	1720 4400	13	0.2	e.e.	6140	678 1540	1540	0.12	3080 5450	8 4.	
							3-651. B	BLACKWATER RIVER NEAR CORTLAND,	RIVER	NEAR C	ORTLAND,	W. VA.									
May 10, 1963 July 10	5,34	e. 6		0.21				1.7		38	3.6	1.0		1.6	99	34 45	3 3	0. 08	71 95	7.1	35 45
							3-673.	3-673. BLACK FORK RIVER	R RIVE	R AT PA	AT PARSONS, W.	VA.									
May 10, 1963	A380 A220	4.9		0.07		11	3.3	1.5	9.0	15	38	1.6	0.0	0.1	72	26	38	0.03	120	6.6	1 8
								-		1							-	-			

		16			04	į	4.2		0 2 0	4		2 2	
	7.1				4.0 3.4		6.4 6.8		.4.	4		4.0	ιń
	62	89	74		222 549		58 118		232	654		663	477
	0.18				0.40	ļ.	14 0.06 40		18.	4			
	80 %	12	13		134		14 40		126	216		200 104	146
	34	36	28		134		21 45		126	216		200	150
	36	46	44		337		38		108	440		420	304
	0.0	. 4	٦.		0.0		0.1		4.6	e.		1.6	3.9
	0.2		٥.				0.2		"	4.			0.4
ė	1.6	2.5	1.1	W. VA.	6.0	W. VA.	1.0	PA.	9.5	70		34	24
-100, Chen hiten at wonderdown, it. in.	32	17	22		91	3-705. BIG SANDY CREEK AT ROCKVILLE, W.	16 39	MONONGAHELA RIVER AT BRADDOCK,	186		CKLEY, PA.	237	166
	15	14	11	AR RUT	00	C AT RO	8 9	BR AT	900	O NIA	T SEW	0 %	5
TU WEL	0.5	?	9.	REEK NE		Y CREEK	1.0	SLA RIV	10.5	OHIO RIVER MAIN STEM	RIVER A	1.8	3.5
Chen h	4.1	, w	1.2	3-702.75. MUDDY CREEK NEAR RUTHBELLE,	1.0	BIG SAND	0.9	MONONGAHI	214	OHIO	3-860. OHIO RIVER AT SEWICKLEY,	20	30
3-100	9.0	1.2	1.1	-702.75.		3-705.	3.7	3-850.	1 80 5	91	3-86	23	12
	7.3	80	9.5	3			6.0		188	2		242	40
	l°	00			2.4		0.00		0.82	7.1		9.6	1.5
	0.14	88	00.		4.5		0.17		188	00.		0.01	.04
	0.1						0.0		180	o N			
	1.3	. 6	3.6		9.4		3.6		12.5	8.8		6.9	8.2
	200	400	280		A20 6.10		140 39		3240	2860		12800 13200	
	May 10, 1963.	Aug. 28	Sept. 19		May 10, 1963		May 10, 1963 July 11		Nov. 26, 1962. July 23, 1963.	Aug. 26	į	Oct. 3, 1962	July 31

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN---Continued

		Color
		Hd
	Specific conduct-	(micro- mhos
	ardness CaCO,	alchim, Non- (micro- nagne-carbon- mhos
ned	H. Se	Calctu
3Contir	Dissolved	(calcu- lated)
ı 196	, N	trate (NO <sub>3</sub> )
Septembe	Fluo-	ride (F)
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued	Chloride	(C1)
r October	Sulfate	( <b>°</b> 0s)
ter yea	Bicar-	bonate (HCO <sub>3</sub> )
on, wa	Po-	stum (K)
per milli	Sodium	(Na)
parts	Mag-	stum (Mg)
ses, in	Cal-	Cium (Ca)
l analy	Ē	(Fe)
hemica	Silte	(SiO <sub>2</sub> )
٥	Discharge	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
		Date of collection

BASIN	
RIVER	
KANAWHA	

ن.
z
MARSHALL.
R NEAR
RIVER
IVY
1530.

66 7.4 70 7.1		7.1								-		$\vdash$		$\vdash$
99				5.9		6.6		6.9		6.9		6.5		6.7
		48		16		15		21 20		23		33		4.9
00		00		0 0		00		0		00		00		-
24 22		18		2.4		9 4		5.0		80 44		10		14
52 43		40		11		17		18		20		30		7.6
0.1		0.1	и. С.	0.1	х. с.	0.0		0.5		0.2		1.3		-
0.2		0.2	WOOD,	0.1	SVILLE,	0.0		0.0		0.0		0.0		-
1.8	Е, N. С.	8.0	TEAR HAZE	0.2	AR WAYNE	0.8	TON, N. C	0.1	и. с.	0.2	K, N. C.	0.6	٥.	0
4.6	STACKHOUS	1.6	LOGAN, N	1.2	LOGAN, NE	1.8	NEAR CANT	1.8	ZELWOOD,	1.6	OVE CREEN	1.4	SIOUX, N.	2 6
32	K NEAR	32	VE LAKE	8	W LAKE	∞ ∞	N RIVER	10	NEAR HA	111	K NEAR	10	R NEAR	00
2.3	EL CREF	1.5	ER, ABC	4.0	R, BELC	0.7	PIGEON	0.6	CREEK	0.7	N CREE	1.1	NE RIVE	
3.7	BIG LAUR	3.0	GEON RIV	9.0	EON RIVE	1.3	AST FORK	1.1	5. ALLEN	1.1	JONATHA	1.8	1640. CA	0
2.0	-4540.	1.8	FORK PI	0.1	ORK PIG	0.1	4565. E	9.0	3-457	6.0	3-4590.	1.2	3-4	6
5.9 4.8	6	3.2	. WEST	1.8	WESTF	1.0	3-	1.4		1.3		1.9		3.4
0.03		0.00	3-4555	0.01	3-4560.	90.0		0.00		0.00		0.02		60 0
15 9.8		11 7.6		6.6		5.8		6.5		8.4		11 8.5		
65.1 113		74.2		23.5		36.7		41.4		6.99		454 157		113
t. 8, 1962r. 23, 1963		t. 8, 1962		v. 2, 1962		v. 2, 1962y 3, 1963		v. 5, 1962		v. 1, 1962		.v. 1, 1962		Oct 10 1982
	1962 65.1 15 0.03 5.9 2.0 4.0 2.3 32 4.6 1.8 0.2 0.1 52 1.0 13 13 1.2 0.0 0.1 1.0 43 1.0 158	65.1   15   0.03   5.9   2.0   4.0   2.3   32   4.6   1.8   0.2   0.1   52   35   1.2   1.0   4.3   3.1   1.2   1.2   3.0   1.0   4.3   3.1   1.2   3.1   3.0   3.1	1962 65-1 15 0.03 5.9 2.0 4.0 2.3 3.7 1.5 3.2 4.6 1.8 0.2 0.1 5.9 5.9 1963 113 1 0.00 4.2 1.8 2.0 1.8 2.0 1.8 0.2 0.1 1.0 5.2 1.8 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	1963 65-1 15 0.03 5.9 2.0 4.0 1.3 1.5 1.5 1.5 1.6 1.8 0.2 0.1 5.9 1.0 43  3-4540. BIG LAUREL CREEK NEAR STACKHOUSE, N. C.  1963 147. 11 0.00 4.2 1.4 2.0 1.8 2.0 1.6 0.8 0.2 0.1 0.7 2.8 1.1 1.8 2.0 1.6 2.0 1.4 0.1 0.7 2.8 1.1 1.8 2.0 1.8 2.0 1.4 0.8 0.2 0.1 0.7 2.8 1.1 0.0 0.0 1.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	1962   165.1   15   0.03   5.9   2.0   4.0   2.3   3.7   1.5   3.2   4.6   1.8   0.2   0.1   5.2   5.9     1963   147.2   1.1   0.00   4.3 4   1.4   3.4   1.4   3.2   1.5   3.0   1.5   3.0   1.5   3.0     1963   147.2   1.1   0.00   4.3 4   1.4   3.4   1.4   3.2   1.5   3.0   1.5   3.0     1963   13.5   6.6   0.01   1.8   0.1   0.1   0.1   0.1   0.1     1963   13.5   6.6   0.01   1.8   0.1   0.1   0.1   0.1   0.1     1963   147.2   1.1   0.00   1.1   0.1   0.1   0.1   0.1     1963   147.3   1.1   0.00   0.01   0.1   0.1   0.1   0.1     1963   147.3   1.1   0.00   0.01   0.1   0.1   0.1   0.1     1963   147.3   1.1   0.00   0.00   0.1   0.1   0.1   0.1     1963   19	1962   165.1   15   0.03   5.9   2.0   4.0   2.3   3.2   4.6   1.8   0.2   0.1   5.2   1.5   1.9   1.0   4.3   1.9   1.0   1.0   1.0   4.3   1.0   1	1962   165.1   15   0.03   4.9   2.0   4.0   1.5   3.2   1.5   3.2   4.6   1.8   0.2   0.1   5.2   0.1     3.4540. BIG LAUREL CREEK NEAR STACKHOUSE, N. C.   1.0   4.0     1963   147.2   1.1   0.04   4.2   1.4   2.2   1.8   2.0   1.4   0.8   0.2   0.1   0.1     1963   147.2   1.1   0.04   4.2   1.4   2.2   1.8   2.0   1.4   0.8   0.2   0.1     1963   13.5   6.6   0.01   1.8   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   6.6   0.01   1.8   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1.8   0.01   1.8   0.01   0.1   0.1   0.1   0.1   0.1   0.1     1.8   0.01   0.01   0.1   0.1   0.1   0.1     1.8   0.01   0.01   0.1   0.1   0.1   0.1   0.1     1.8   0.05   0.01   0.1   0.1   0.1   0.1   0.1   0.1     1.8   0.06   0.01   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1.8   0.05   0.05   0.05   0.05   0.05   0.05   0.05   0.1   0.1   0.1   0.1     1.8   0.05   0.05   0.05   0.05   0.05   0.05   0.05   0.05   0.05   0.05   0.05   0.05     1.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1.1   0.1	1962   165.1   15   0.03   5.9   2.0   4.0   1.3   3.2   1.5   3.2   4.6   1.8   0.2   0.1   5.0   5.2   1.9   1.0   5.2   1.0   5	1962   153   156   0.03   5.9   2.0   4.0   1.5   3.3   3.9   4.6   1.8   0.2   0.1   5.2   2.9   2.9   2.0   3.4   2.3   3.4   3.	1962   153   156   156   2.03   5.9   2.0   4.0   1.3   3.2   4.6   1.8   0.2   0.1   5.2   2.2   2.9   2.0   3.4   2.2   3.4   3.	1962   163.1   15   15   16.03   5.9   2.0   4.0   1.3   3.2   4.6   1.8   1.8   1.0   1.0   4.3   2.0   1.9   1.0   1.0   4.3   2.0   1.0   1.0   1.0   4.3   2.0   1.0   1.0   1.0   4.3   2.0   1.0   1.0   1.0   4.3   2.0   1	1962   163.1   15   0.03   5.9   2.0   4.0   1.3   3.2   4.6   1.8   0.2   0.1   1.0   4.3   2.3   1.5   1.5   1.4   0.0   0.1   1.0   4.3   2.3   1.5   1.4   0.8   0.2   1.4   0.8   0.2   0.1   1.0   4.3   1.4   1.4   2.2   1.5   2.2   1.4   2.2   1.4   2.2   1.4   0.8   0.2   0.1   0.1   1.5   2.8   1.4   1.4   0.8   0.2   0.1   0.1   0.1   1.5   0.8   0.2   0.1   0.	1962   15   15   16   16   16   17   18   17   18   18   18   18   18	1962   163.1   15   15   10.00   4.0   2.0   4.0   1.2   1.3   3.2   4.6   1.8   0.0   0.1   1.0   4.3   2.0     1963   147.2   17.6   0.00   4.2   1.8   3.0   1.5   2.0   1.6   0.0   1.4   0.0   0.1   0.1   0.1     1963   147.2   17.6   0.00   4.2   1.8   3.0   1.5   0.0   1.6   0.0   1.6   0.0   0.1   0.1   0.1     1963   13.5   6.6   0.01   1.8   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   6.6   0.01   1.8   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1962   13.5   6.6   0.01   1.8   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1962   13.5   0.00   1.0   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.0   0.0   1.0   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.4   0.6   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.4   0.6   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.4   0.6   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.4   0.6   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.4   0.6   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.4   0.6   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.4   0.6   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.1     1963   13.5   0.00   1.4   0.6   0.1

# MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN -- Continued

Color 띥 Calcium, Non- (micro-magne-carbon- mhos sium ate at 25°C) Specific conduct-Hardness as CaCO, Chemical analyses, in parts per million, water year October 1962 to September 1963 -- Continued Dissolved
Solids
(calcu-Clated) Ni-trate (NO<sub>3</sub>) Fluo-ride (F) Chlor ide (C1) Sulfate (SO<sub>4</sub>) Bicar-bonate (HCO<sub>3</sub>) Po-tas-stum (K) Sodium (Na) Mag-ne-sium (Mg) Cal-cium (Ca) Iron (Fe) Silica (SiO<sub>2</sub>) Discharge (cfs) Date of collection

### TENNESSEE RIVER BASIN--Continued

ž.
GROVE,
SUGAR
NEAR
RIVER
WATAUGA
-4790.

ro 4		20		0 0		25		10		10		10		ကြက	
6.8		7.2		6.9		4.2		6.9		6.8		6.6		6.6	
55		28 26		31		14 46		24		26 18		19		15	
0 8		00		0 0		1 4		0 0		0 0		00		0.0	
26		6 7		12 8		4 4		8		10		8 4		æ <b>9</b>	
39		24		28		13		25 19		26 22		21 17		17	
1.8		0.2		0.5		1.1		0.1		0.2		0.3		4.0	
0.1		0.0		0.0		0.1		0.0		0.0		0.1		0.0	
1.2	is, N. C.	4.0	N, N. C.	0.8	и. с.	0.4	и. с.	0.8	E, N. C.	0.8		0.4	и, с.	1.1	
2.2	AR PRENTIS	3.0	AR FRANKL	1.4	IGHLANDS,	9.6	ULLASAJA,	1.8	AT NEEDMON	0.2	NBOW SPRIN	3.0	ANTAHALA,	1.2	
32	IVER NE	15	REEK NE	16 17	ER AT H	40	ER AT C	16	RIVER	18	EAR RAI	110	ER AT N	ထော	
1.5	NESSE R	0.9	CHAYE C	9.0	AJA RIV	0.5	AJA RIV	0.7	NNESSEE	0.7	RIVER N	0.5	IALA RIV	4.0	
2.7	TTLE TEN	2.3	CARTOOGE	1.8	. CULLAS	1.1	. CULLAS	1.8	TTLE TE	1.8	NTAHALA	1.0	NANTAF	9.0	ĺ
2.2	000 LI	0.2	002.4.	1.8	3-5005	0.4	3-5010	0.7	5030. L	0.8	040. NA	0.4	3-5055	0.0	
4.8	3-5	1.9	3-5	2.1		1.1		1.6	3-	2.6	3-5	2.9		8.1.8	
0.00		0.01		0.04		0.04		0.00		0.05		0.00		0.00	
9.3		9.3		9.3		3.5		9.3		9.2		7.5		5.9	
59.5		156 237		41.5 92.8		8.66		41.6		333 850		62.6 212		632 660	
ay 13, 1963		ct. 11, 1962		ov. 6, 1962		ct. 10, 1962		ov. 6, 1962		ov. 1, 1962		ay 8, 1963		ay 10, 1962	
	14         0.00         7.1         2.2         2.7         1.5         32         3.2         2.6         0.1         1.1         51         26         0         69           9.3         .00         4.8         2.7         2.5         1.2         26         2.4         1.2         .1         1.8         39         23         2         55	59.5 14 0.00 7.1 2.2 2.7 1.5 32 3.4 1.2 2.6 0.1 1.1 51 26 0 69 64 9.3 0.00 4.6 2.7 2.5 1.2 2.6 2.4 1.2 1.1 1.8 39 23 2 55 55 3-5000. LITHE TRINESSE RIVER NEAR PRENTISS, N. C.	59.5   14   0.00   7.1   2.2   2.7   1.5   32   3.2   2.4   1.2   0.1   1.1   51   26   0.6   6.8	59.5 144 0.00 7.1 2.2 2.7 1.5 32 3.2 2.4 1.5 6.8 6.8 6.8 6.8 6.8 6.4 1.1 51 2.6 0.1 1.1 51 2.6 6.8 6.8 6.8 6.8 6.8 6.8 6.8 6.8 6.8 6	59.5   14   0.00   7.1   2.2   2.7   1.5   32   3.2   2.4   1.2   0.1   1.1   51   26   0.6   6.8     64   9.3   0.00   4.8   2.7   2.5   1.2   2.6   2.4   1.2   0.1   1.1   39   23   2   55   7.5     156   9.3   0.01   1.9   0.2   2.2   0.7   1.5   3.0   0.8   1.5   0.0   0.2   24   7   0   26   6.6     3 - 5002.4   CARTOGECHATE CREEK NEAR PRANKLIN, N. C.   1.4   0.8   1.8   0.6   1.8   1.8   0.6   1.8   0.6   1.8   0.6   1.8   0.6   0.6   0.5   2.8   0.6   0.5     41.5   11   0.04   1.9   1.8   2.0   0.6   1.8   1.6   0.6   1.8   0.6   0.6   0.5   0.6   0.5   0.6   0.5     5 - 5 - 5 - 5 - 5 - 5 - 5 - 5   7.5   7.5     5 - 5 - 5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5   7.5     5 - 5 - 5 - 5   7.5     7 - 5 - 5 - 5     7 - 5 - 5 - 5     7 - 5 - 5 - 5     7 - 5 - 5 - 5     7 - 5 -	59.5   14   0.00   7.1   2.2   2.7   1.5   32   3.2   2.4   1.2   0.1   1.1   51   26   0.6   6.8     64   9.3   0.00   7.1   2.5   1.2   2.5   1.2   2.6   1.2   2.4   1.2   3.0     3-5000. LITTLE TENNESSE RIVER NEAR PRENTISS, N. C.   2.4   0.0   2.4   2.4   7   0   26   6.6     3-5002.4. CARTOGGEGIAYE CREEK NEAR FRANKLIN, N. C.   3.0   0.5   2.4   8   0.0   2.1   3.0     92.8   9.3   0.00   2.1   1.9   1.8   2.0   0.8   1.4   1.8   0.8   0.0   0.5   2.4   8   0   2.9   6.8     3-5002.4. CARTOGGEGIAYE CREEK NEAR FRANKLIN, N. C.   3.0   0.5   2.4   8   0   3.1   6.9     92.8   9.3   0.00   2.1   1.9   1.8   0.6   1.7   1.8   0.0   0.5   2.8   1.8   0.0   2.9   6.8     92.8   9.3   0.00   2.1   0.9   1.8   0.8   1.8   0.8   0.8   0.8     92.8   9.3   0.00   0.5   0.8   0.8   0.8   0.8   0.8   0.8     93.8   93.8   93.8   0.00   0.5   0.8   0.8   0.8   0.8     94.8   95.8   95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8   0.8   0.8     95.8   0.8   0.8   0.8   0.8	156   143   0.00   7.1   2.2   2.7   1.5   32   3.2   2.4   1.5   32   3.2	156   14.3   0.00   7.1   2.2   2.7   1.1   2.2   2.4   1.2   2.4   2.4   1.2   2.6   0.1   1.1   51   2.6   0.2   6.5   7.5     156   9.3   0.01   1.9   0.2   2.2   0.9   1.5   2.0   0.9   0.4   0.0   0.4   2.4   7   0.0   2.6   7.5     157   9.3   0.01   1.9   0.2   2.2   0.9   1.5   0.9   1.5   0.9   0.4   0.0   0.4   2.4   7   0.0   2.5   0.5     158   159   0.00   1.0   0.8   2.2   0.9   1.5   0.9   1.5   0.9   1.5   0.9   1.5   0.9     158   159   0.00   2.1   0.00   2.1   0.8   1.4   0.8   0.0   0.5   2.4   0.0   0.5   0.5     158   9.3   0.00   2.1   0.00   0.1   0.8   0.9   0.0   0.0   0.0   0.0     159   0.00   0.1   0.00   0.1   0.0   0.0   0.0   0.0     150   0.00   0.1   0.0   0.0   0.0   0.0   0.0     150   0.00   0.00   0.0   0.0   0.0   0.0   0.0     150   0.00   0.00   0.00   0.0   0.0   0.0     150   0.00   0.00   0.00   0.00   0.0   0.0     150   0.00   0.00   0.00   0.00   0.00   0.0     150   0.00   0.00   0.00   0.00   0.00   0.00     150   0.00   0.00   0.00   0.00   0.00   0.00     150   0.00   0.00   0.00   0.00   0.00     150   0.00   0.00   0.00   0.00   0.00     150   0.00   0.00   0.00   0.00     150   0.00   0.00   0.00   0.00     150   0.00   0.00   0.00   0.00     150   0.00   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00     150   0.00   0.00   0.00     150   0.00   0.00	156   9.3   0.00   7.1   2.2   2.7   1.5   32   3.2   1.2   2.4   1.1   51   26   6.8   7.5	156 9.3 0.00 4.8 2.7 1.15 3.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1	156   14.3   0.00   4.8   2.7   2.7   1.5   32   3.2   2.4   1.5   3.6   0.1   1.1   51   39   23   29   6.8   9	10, 1962 64 5 14 0.00 7.1 2.2 2.7 1.5 32 3.2 2.4 1.8 0.1 1.1 51 2.2 2.5 1.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2	10, 1962	10, 1962 69, 5 14, 3 0.00	15, 1962   646   9.5   14   0.00   7.1   2.2   2.5   11.2   2.6   2.4   1.2   2.6   2.4   1.2   2.5   1.2   2.5

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	80.44				5		4.6		20		17		25 19		27 18		22 17
	18		30		15		14		20 15				122		1 2		1 2
	0.0		8.0		1.0		0.2		0.1	c.	1.2		2.6		0.4		1.2
	0.0		0.0		0.0		0.0		0.0	LE, N.	0.0		0.0		0.0	GA.	0.0
E, N. C.	1.6		2.0	, м. с.	0.0	, N. C.	0.6	GA.	1.0	HAYESVII	0.6	и. с.	1.0	LE, GA.	1.0	R IVYLOG,	1.7
3-5080, TUCKASEGEE RIVER AT TUCKASEGEE, N.	4.2	3-5090. SCOTT CREEK ABOVE SYLVA, N.	1.6	3-5120. OCONALUFTEE RIVER AT BIRDTOWN,	1.2	3-5135. NOLAND CREEK NEAR BRYSON CITY, N.	1.0	3-5450. HIWASSEE RIVER AT PRESLEY, GA	1.2	3-5470. HIWASSEE RIVER, BELOW CHATUGE DAM, NEAR HAYESVILLE, N.	0.6	3-5485. HIWASSEE RIVER ABOVE MURPHY, N.	3.6	3-5505. NOTTELY RIVER NEAR BLAIRSVILLE,	2.8	3-5535. NOTTELY RIVER, AT NOTTELY DAM, NEAR IVYLOG,	8.0
ER AT	∞ ∞	( ABOVE	16	IVER AT	10	EAR BR	9 9	I VER AT	10	HATUGE	13.8	ER ABOV	14 41	R NEAR	14	NOTTELY	10
GEE RIV	0.5	T CREE	6.0	FTEE R	0.3	CREEK	0.3	SSEE R	0.7	ELOW CI	0.7	SEE RIV	0.9	Y RIVE	0.8	R, AT	1.0
TUCKASE	1,6	190. SCOT	1.5	OCONALL	1.1	NOLAND	1.0	50. HIWA	1.6	RIVER, F	0.9	HIWAS:	1.7	S. NOTTEI	1.4	TELY RIVE	1.6
3-5080.	0.6	3-50	1.2	3-5120,	0.3	3-5135.	0.4	3-54	0.2	IIWASSEE	9.0	3-5485	1.3	3-550	0.6	335. NOT	8.0
	1.4		2.2		1.1		1.9		1.6	5470. E	1.9		1.6		1.6	3-55	2.2
	0.01		0.01		0.02		00.00		0.02	3-	0.04		0.01		0.02		0.23
	5.2		11 8.9		6.0		5.1		8.0		3.5		5.2		8.1		3.3
	730 528		54.7 103		332		36.9		50.5		20.4		187 566		73.8 176		1630 1390
	Nov. 2, 1962		Nov. 2, 1962		Nov. 29, 1962		Nov. 28, 1962		Oct. 9, 1962		Oct. 9, 1962		Oct. 8, 1962		Oct. 9, 1962		Oct. 9, 1962

## MISCELLANEOUS ANALYSES OF STREAMS IN ORIO RIVER BASIN

	Alu- Man- C. Mag- Po- 1 teh Bi- Car Phos-	Hilter mil- Iron ger dem stam (Na) sium bor- ate (SO <sub>4</sub> ) (Ci) (R) (Mn) (Ca) (Mg) (Ca)	MONONGAHELA RIVER BASIN	3-507. LEADING CREEK AT GILMAN, W. VA.	3.3 4.4 0.08 0.7 10 10 10 1.0 0.3 0.05 11 4 0.0 36 6.4 0.0 0.0	3-509, GRASSY RUN AT NORTON, W. VA.	2.3         1.0         30         17         4.4         4.48         448         11         1960         2.8           2.3         33         62         5.4         0         900         7.0         1400         450         10         1880         2.6	3-570, ITGART VALLEY RIVER AT COLFAX, W. VA.	625 4.6 0.19 0.08 10 8.4 1.8 2.1 0.9 5 3.0 0.0 0.0 0.18 0.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	3-588. BROWNS CREEK NEAR CLARKSBURG, W. VA.	15.5 13 55 4.1 0 820 8.0 1120 700 3.0 1570 3.2 6.6 19 5.4 1.0 1570 980 1.0 1950 3.9	3-610. WEST FORK RIVER AT ENTERPRISE, W. VA.	60 20 16 11 6.3 206 63 112 4.3 0 1060 11 0.9 1.1 1670 774 774 4.4 2300 3.0 5 0.0	3-651. BLACKWATER RIVER NEAR CORTLAND, W. VA.	5.3 3.9 0.21 0.71 7.1 35 3.6 2.4 0.8 0.08 66 34 3 0.0 71 7.1 35 0.0 0.0	3-672. BLACK FORK RIVER AT PARSONS, W. VA.	260 4.9 0.02 11.5 3.3 1.2 0.6 15 18 1.6 0.0 0.0 2 41 38 2 120 4.9 2 0.0	3-690. SHAVERS FORK AT PARSONS, W. VA.	
-		SiO <sub>2</sub> ) mun (Al)			4.4		1.0 30				113				3,9		4.9		-
		collection Discharge Si					_				Aug. 13, 1963 15.5				-				

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	9 16		222 4.0 549 3.4		58 6.4 118 6.8			2130 5620			687 772		727	
	0.0		62 0.6 134 1.8		0.0			<del>*</del> •						
	888				14 40			1800			83 94		83	
	34		134		45			740 1970			285 314		300	
	36		337		38			1340			398 448		417	
	9.18		0.40		90.0						2.90		3.5	
	0.0 0.18		0.0 0.40		0.1 0.06			e			0.2 0.90 2.3 1.2		7.06	
	0.2				0.2			0.3				(E)		
₩. VA.	1.6	W. VA.	6.0	W. VA.	1.0		оню	490 1780		011	48 66	WOLF CREEK AT DAYTON, OHIO(AT OLIVE ROAD BRIDGE)	40	
3-700. CHEAT RIVER AT ROWLESBURG, W. VA.	30	3-702.75. MUDDY CREEK NEAR RUTHBELLE, W. VA.	91	3-705. BIG SANDY CREEK AT ROCKVILLE,	39	IN	3-1575, HOCKING RIVER AT LANCASTER, OHIO	8 80	ASIN	3-2710. WOLF CREEK AT DAYTON, OHIO	66	OLIVE RO	74	
T ROWL	15	EAR RU	-	AT BOC	8 9	HOCKING RIVER BASIN	AT LA	0.80	IVER B	AT DA	9	IO(AT	4.8	
IVER A		REEK N		REEK		NG RIV	RIVER	330	IAMI R	CREEK	246 267	HO , NC	264	-
HEAT RI	0.5	UDDY CI		SANDY (	1.0	HOCKI	OCKING	3.7	GREAT MIAMI RIVER BASIN	. WOLF		T DAYT		NO2).
700. מ	1.4 0	.75. M	1.0	. BIG	0.9 0		575. H		b	3-2710		REEK A	-	rite (
, i		3-702		3-705			3-1	149 357		.,		OIF CI		m nit
	0.6				3.7			64 153				*		00 pp
	10,1				6.0			191 536						and 0.
	00.0		2.4		0.00			.2						(MH4)
	0.14 0.00		4.5		0.17 0.00			3.8						uego.
	0.1				0.0									a nitr
	1.3		9.4		3.6			12,8.4			-			mmon!
	330		20 6.1		39									a Includes 0.0 ppm ammonia nitrogen (NH,) and 0.00 ppm nitrite (NO $_2$ ).
	963a		963.		963 8			1962 963.			962.		1962	ndes 0.
	May 10, 1963a July 11		May 10, 1963. July 11		May 10, 1963 a			Sept. 21,1962 Feb. 5, 1963.			Oct. 6, 1962. Nov. 19		Oct. 12, 1962 Nov. 19	Incl
	May July		May July		May July			Sept Feb.			Oct.		Oct.	<b>4</b>

# MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN -- Continued

	Organics te- Alkyl	ben- zene sulfo- nate (ABS)						် ကို ကို ဆို						
	Ori Phe-						150.007	000.						odor - od
		pH Col-			ਲ π ∞ ∞		8.0	7.6			7.6		0.7.7.0 0.8.8.18.	
	ecific nduct-	ance (micro- mhos at 25°C)			636		761	727 736 803			68 72 77		123 123 124 127	
	To-Specific tal conduct-	acid- ity (n as m H+1 2												, and , and , and , and
	Hardness as CaCO <sub>3</sub>	Non- car- bon- ate			58			122 87 92			24.2		100 100 60 60	turbidity, turbidity, turbidity, turbidity, turbidity,
	Hard as C	Cal- cium, mag- nesium			324		328	306 312 340			33		66 61 60 58	ppm tur ppm tur ppm tur ppm tur ppm tur
tinne	pealos				380		487	456 452 498						, 20 , 15 , 7 , 15
3Cor	Phos-Dissolved	us (re as (re (PO <sub>4</sub> )at			.37		0.20	333						(NO <sub>2</sub> ) (NO <sub>2</sub> ) (NO <sub>2</sub> ) (NO <sub>2</sub> )
er 196					5.5		1 0	1 2 3			1.2		9.00	ppm nitrite ppm nitrite ppm nitrite ppm nitrite ppm nitrite
eptemb	- Cilla	ride (F)				оню				, KY.	0.1	AANCH)		n mdd n mdd n mdd n mdd
32 to Se		Chloride (C1)	P	оню	14	.0.),	42	44 48 48		H CAVE,	5.0 6.4 2.0	PINE BRANCH	00000	0.35 0.35 0.50 0.60 0.70
ber 196		Sulfate C (SO <sub>4</sub> )	GREAT MIAMI RIVER BASINContinued		50	RIVER AT VENICE (ROSS P.O.),	34	102 106		MAMMOT	3.2	(0.1 MILE BELOW	9.6 6.8 5.8 8.6 10	0.4 ppm ammonia nitrogen as NH, 1.2 ppm ammonia nitrogen as NH, 1.6 ppm ammonia nitrogen as NH, 9.6 ppm ammonia nitrogen as NH, 2.2 ppm ammonia nitrogen as NH,
r Octo	Į.	Solution (Solution)	NC	AR ING	9	SNICE	-		MASIN	NEAR		MILE.		nitrogen as nitrogen as nitrogen as nitrogen as
er yea	Pi-	ate (HCO <sub>3</sub> )	VER BA	3-2718. TWIN CREEK NEAR INGOMAR,	310	RATV	252	224 302	GREEN RIVER BASIN	CREE	38		71 62 66 63	tia nii
, wat	#		MI RI	IIN CR					REEN	UFFAL		UN, K		ammor ammor ammor ammor
1111or	Po-	tas- sium (K)	AT MIA	18. TW		MIAMI				RONG E		CUB H		0.4 ppm ammonia n 1.2 ppm ammonia n 1.6 ppm ammonia n 2.6 ppm ammonia n 2.2 ppm ammonia n
in parts per million, water year October 1962 to September 1963 Continued		Sodium (Na)	GRE	3-27		3-2745. GREAT MIAMI				3-3091. WET PRONG BUFFALO CREEK NEAR MAMMOTH CAVE,		CREEK NEAR CUB RUN, KY.		<b>.</b>
in par	Mag-	stum (Mg)				3-274				3-309		DOG CRU		ssolved oxygen (11) percent saturation, solved oxygen (12) percent saturation) solved oxygen (120 percent saturation) solved oxygen (70 percent saturation) solved oxygen (60 percent saturation), solved oxygen (62 percent saturation),
	5						L.					ı		percent percen
anal		ga- nese (Mn)			_			1.25						(141 pc (110 per (120 per (76 per (90 per
Chemical analyses,		Iron (Fe)					0.27	24.			0.09		0.29 .35 .53 .11	ygen ( gen (1 gen (1 gen ( gen (
ទ	Alu-	a mi-			_									ssolved oxygen solved oxygen solved oxygen solved oxygen solved oxygen
		(SiO <sub>2</sub> )			_						0 5 4		82194	ssolved ssolved ssolved ssolved ssolved
		Discharge Silica (cfs) (SiO <sub>2</sub> )									1.5		44696	4 ppm di 5 ppm di 1 ppm di 2 ppm di 5 ppm di 5 ppm di
	Dote	of collection			Nov. 1, 19628 Nov. 19		July 31, 1963b	Aug. 14.d Aug. 28.e Sept. 5.f			June 12, 1962 July 26 Dec. 7		Nov. 1, 1961. June 13, 1962 July 26. Sept. 28 Dec. 7.	a Includes 16.4 ppm dissert includes 8.5 ppm dissert includes 9.1 ppm dissert includes 6.2 ppm dissert includes 5.5 ppm dissert Includes 5.2 ppm dissert includes 5.2 ppm d

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN -- Continued

	lur-	Col- bid- or ity					-			i						6 40
		-10.70 -10.70											0 01 E			2827
		μd			7.6		7.8		97.0	8.08.7			0.00			7.5
	To-Specific tal conduct-	acid- ance ity (micro- as mhos at H+1 25°C)			148 141 144		134 127 118		225	223 223 203 203			38 28 88			187 203 129
	F P	acid- ity (i as n H+1														
		Non- car- bon-			608		12 9 8		9 9 5	844			101			
	Hardness as CaCO,	Cal- clum, mag- esium			68 65 67		63 59		102	110 105 95			12 8 8			
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued	Phos Dissolved	solids (residue at 180°C)											22 22 22 23			102 122 84
63	Phos-	No.														
er 19	ž	(NO <sub>3</sub> )		a	2.9.2		0.0		9.6	800			0.00			
temp	, in	(F) (NO <sub>3</sub> )		CREE	0.10		0.1		1.010	بجج			120		1, KY.	
o Sej				DOG :	000		000		0.00	90.0			2000		DUCA	18 17 6.5
962 t		Chloride (C1)		TTI		₩.						, KY.			AR PA	
er 1		Sulfate (SO <sub>4</sub> )	GREEN RIVER BASIN Continued	OW L	8.0 10 13		1120	ĸ.	0.80	5.0	Z	HELTON BRANCH AT GREENWOOD,	2.6	-	KENTUCKY DAM NEAR PADUCAH,	13 16 9.2
Oc to	4.	<u> </u>	Cont	E BEI		BYLEW CREEK NEAR MAMMOTH CAVE,		RHODA,		- 2	CUMBERLAND RIVER BASIN	GREE		TENNESSEE RIVER BASIN	KY D/	
year	් ප්	7 90 00 00 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	SIN	6 MII	222	MAMMO	63 61 55		8 4 8	1220	RIVEF	H AT	101	IVER	ENTOC	2860
ter	超易	ate (HCO <sub>3</sub> )	3R BA	.00		YEAR		CREEK AT			LAND	BRANC		SEE R		
n,		E	RIV	, KY		EEK 1		DAM (			MBERI	NOI,		NNES	IVER	
11110		stum (K)	GREEN	B RUN		EW CH		BEAVER DAM					0.7 9.	H	SEE B	
s per m		Sodium (Na)		DOG CREEK NEAR CUB RUN, KY. (0.6 MILE BELOW LITTLE DOG CREEK)		BYL		BE				3-4073.	1.3		3-6095, TENNESSEE RIVER AT	
n part	Mag-	sium (Mg)		CREEK									6.50		-6092	
ses, 1	-[e]	ctum (Ca)		DOG									222		63	
analy	Man-	ga- nese (Mn)											0.05 .02 £1.3			0.04
nical		Iron (Fe)			0.49 0.05		0.21		0.10	14.2.2			0.05			0.09
Che	Alu-	(All)														
		Silica (SiO <sub>2</sub> )											6.1			1.2.2
		Discharge Silica (cfs) (SiO <sub>2</sub> )			8.4.8 E.5.		8.1.1 8.1.1			8.8.6.						
	Date	of			June 13, 1962 Sept. 28 Dec. 7		July 25, 1962 Sept. 27 Dec. 7		Sept. 5, 1961 oct. 31	July 25 Sept. 27 Dec. 6			Jan. 30, 1962 July 17			Nov. 20, 1962 Feb. 6, 1963. Apr. 22

### MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN OHIO RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1962 to

UPPER TWIN CREEK BASIN  3-2372.8. UPPER TWIN CREEK AT MCGAW, OHIO  Sept. 17, 1963	Mean concentration (ppm)  18  HIO  40 20 5	ded sediment  Discharge (tons per day)  T  146 18
Date	concentration (ppm)  18  HIO  40 20 5	(tons per day)  T  146 18
3-2372.8. UPPER TWIN CREEK AT McGAW, OHIO  Sept. 17, 1963	40 20 5	146
Sept. 17, 1963	40 20 5	146
GREAT MIAMI RIVER BASIN  3-2630. GREAT MIAMI RIVER AT TAYLORSVILLE, OH  Apr. 6, 1960. 0930 1350  Apr. 6, 1961 1220 335  Apr. 1130 343  Apr. 1545 314  Apr. 1545 314  Apr. 162 1545 318  Peb. 14, 1962 1630 464  Peb. 26 1230 4410  Peb. 28 0940 9020  Apr. 18 1230 424  Apr. 18 1230 424  Apr. 18 1230 424  Apr. 18 1230 424  Apr. 18 195  Apr. 18 195  Apr. 196 13 130  Apr. 196 196 196  Apr. 196 196 196  Apr. 196 196 196  Apr. 196 196 196  Apr. 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196 196  Apr. 196  Apr	40 20 5	146
3-2630. GREAT MIAMI RIVER AT TAYLORSVILLE, OH Apr. 6, 1960. 0930 1350 1350 100. 1, 1961 1230 335 100. 1, 1961 130 343 100. 1, 1961 1515 314 100. 30 1515 318 100. 1, 1961 1630 464 100. 1, 1962 1630 464 100. 1, 1962 1630 464 100. 1, 1962 1630 464 100. 1, 1962 1630 464 100. 1, 1962 1630 464 100. 1, 1962 1630 464 100. 1, 1962 1630 1630 1630 1630 1630 1630 1630 1630	40 20 5	18
Apr. 6, 1960         0930         1350           Iov. 1, 1961         1230         325           Iov. 9         1130         343           Iov. 15         1545         314           Iov. 30         1515         318           Ieb. 14, 1962         1630         464           Ieb. 26         1230         4410           Ieb. 28         0940         9020           Ippr. 18         1230         424           Iune 13         1430         330           Iuly 18         1645         130           Iuly 25         0845         195           ug. 1         0820         116           ug. 8         0845         116           lept. 19         1615         83	40 20 5	18
iov. 1, 1961     1230       iov. 9     1130       iov. 15     1545       iov. 15     1545       iov. 30     1515       ieb. 14, 1962     1630       464       'eb. 26     1230       4410       'eb. 28     0940       upr. 18     1230       424       uue 13     1430       330     1419       18     1645       130     1041       18     195       uug. 1     0820     116       ug. 8     0845     116       lept. 19     1615     83	20 5	18
10	5	
ov. 15.     1545     314       ov. 30.     1515     318       eb. 14, 1962.     1630     464       eb. 26.     1230     4410       eb. 28.     0940     9020       pr. 18.     1230     424       une 13.     1430     330       uly 18.     1645     130       uly 25.     0845     195       ug. 1     0820     116       ug. 8     0845     116       ept. 19.     1615     83		
ov. 30.     1515     318       eb. 14, 1962.     1630     464       eb. 26.     1230     4410       eb. 28.     0940     9020       pr. 18.     1230     424       une 13.     1430     330       uly 18.     1645     130       uly 25.     0845     195       ug. 1     0820     116       ug. 8.     0845     116       ept. 19.     1615     83		5
eb. 14, 1962. 1630 464  eb. 26. 1230 4410  eb. 28. 0940 9020  pr. 18. 1230 424  une 13. 1430 330  uly 18. 1645 130  uly 25. 0845 195  ug. 1 0820 116  ug. 8. 0845 116  ept. 19. 1615 83	19	16
eb. 26. 1230 4410 eb. 28. 0940 9020 pr. 18. 1230 424 une 13. 1430 330 uly 18. 1645 130 uly 25. 0945 195  ug. 1 0820 116 ug. 8. 0845 116 ept. 19. 1615 83	6	5
eb. 28. 0940 9020 ppr 18. 1230 424 une 13. 1430 330 ully 18. 1645 130 ully 25. 0845 195 ug. 1 0820 116 ug. 8. 0845 116 ept. 19. 1615 83	15	19
eb. 28. 0940 9020 ppr 18. 1230 424 une 13. 1430 330 ully 18. 1645 130 ully 25. 0845 195 ug. 1 0820 116 ug. 8. 0845 116 ept. 19. 1615 83	1270	15100
pr. 18. 1230 424 une 13. 1430 330 uly 18. 1645 130 uly 25. 0845 195  ug. 1. 0820 116 ug. 8. 0845 116 ept. 19. 1615 83	170	4140
une 13. 1430 330 ulty 18. 1645 130 ulty 25. 0845 195 ug. 1. 0820 116 ug. 8. 0845 116 ept. 19. 1615 83	10	11
uly 18.     1645     130       uly 25.     0845     195       ug. 1.     0820     116       ug. 8.     0845     116       ept. 19.     1615     83	42	37
uly 25.     0845     195       ug. 1.     0820     116       ug. 8.     0845     116       ept. 19.     1615     83	32	11
ug. 8	52	27
ug. 8	44	14
ept. 19 1615 83	33	10
	27	6
cpt. 22 1343	28	6
ct. 10 1430   106	32	9
	11	2
ct. 31	2	.5
pr. 16, 1963 1530	14	
ay 21 1445 260	35	24
3-2650. STILLWATER RIVER AT PLEASANT HILL, OH	110	
pr. 5, 1960 1330 576	26	40
an. 12, 1962 1250 290	54	42
an. 17	186	708
eb. 26	462	9030
eb. 28 1445 2370	112	717
CUMBERLAND RIVER BASIN		
3-4040. CUMBERLAND RIVER AT WILLIAMSBURG,	KY.	
ar. 6, 1963 1325 19400	1140	59700
	1860	105000

Mar. 6, 1963	1700	19400 20900 24400 24600	1140 1860 1750 1760	59700 105000 115000 117000

T Less than 0.05 ton.

### STREAMS TRIBUTARY TO LAKE SUPERIOR PART 4. ST. LAWRENCE RIVER BASIN

4-155. SECOND CREEK NEAR AURORA, MINN

LICOMING. RRA.—18 by State miles observed from gaging station, 0.5 mile downstream from First Creek, and 2.1 miles east of Aurora, St. Louis County, MANNER RRA.

18 county and analyses the supervention and the supervention of

Chemical analyses, in parts per million, water year October 1962 to September 1963

23 23 23 13 12 15 37 30 20 25 29 29 38 Col 346 6.8 298 6.8 315 7.0 302 7.3 419 7.7 6.8 7.0 7.5 7.9 7.7 7.6 7.0 6.6 띥 mhos at 25°C) 4111 437 409 388 496 428 302 312 367 duct-446 ance microcon-9.0 20787 7.9.7.9.10.1 adratio tton 51 57 54 51 44 51 48 55 58 67 55 33 38 38 Noncar--uoq Hardness as CaCO, 128 115 116 117 117 Cal-Mag-167 180 171 159 223 98 106 134 stum ne-1.43 1.73 14.5 25.0 9.62 10.8 11.2 11.3 6.15 4.97 4.16 3.06 Tons Dissolved solids (residue at 180°C) per acre-0.36 .37 .35 36 26 32 32 32 38888 Tons per 265 275 261 246 311 267 192 189 189 232 per million 386 216 207 209 284 Parts 118.0 18818 11881 8 E (8) trate (NO.) 1 C C 4 0.4.04.8 0.5.08.0 'n Fluoride (F) 1100 2 24H | 2 1 6.4: Chloride <u></u> 118 118 119 113 113 16 11 11 18 18 17 Sulfate (SO<sub>4</sub>) 67 71 62 62 55 55 55 61 64 74 71 60 57 48 66 Car-bon-cos 0000 0 00000 00000 HCO. 78 73 90 02 39 Car-bon-150 150 137 137 98 210 169 52 58 58 ate Po-tas-stum (K) 2.5 1 | 44 Sodium (Na) 20 21 17 17 82 19 19 19 19 17 17 17 18 29 4 4 4 4 • 4 Mag-ne-stum (Mg) 20 20 20 19 24 112 114 117 113 113 118 22 Cal-Ctum (Ca) 220449 42 24 27 25 31 .61 .89 .68 35 35 40 0.58 .62 .70 .64 Fe) 1,3 Silica (SiO<sub>2</sub>) 24 21 8.1 8.5 16.5 10 21.1 20.0 9.7 20 11 14 16 16 16 21 27.9 27.9 49.0 Mean discharge (cfs) 0.0.4 3,5 14.2 day 1-31..... 1-26, 28-30 Nov. 29..... 17-31..... Apr. 1-17..... 30... Dec. 1-24..... 4pr. 19-30.... oct. 1-31, 1962. 1963..... 21-Feb. 16. 17-Mar. 16. collection Nov. 1-28, og gr Mar.

Na. Calculated Na plus K, reported as

i

4-155. SECOND CREEK NEAR AURORA, MINN. -- Continued STREAMS TRIBUTARY TO LAKE SUPERIOR -- Continued

1		Col	45	35	29	1
		Hď	470 7.3 477 7.2	366 6.9	404 7.1	
	Specific	duct- ance (micro- mhos at 25°C)				1
	& :	ad- ad- sorp- tion ratio	1.1	0.8	7.0	1
	ness ICOs	Non- car- bon- ate	53	51	20	
	Hardness as CaCO <sub>3</sub>	Cal- cium, Mag- ne- sium	161 173	135	158	
lnued	Dissolved solids residue at 180°C)	Tons per day	12.5 8.62	8	-	-
Cont	<b>Dissolved solids</b> esidue at 180°	Tons per acre- foot	0.42	0.32		1
September 1963 Continued	Dis (resi	Parts per million	307	235	259	1
eptem		Bo- ron (B)	0.06	-	1	1
to S		trate (NO <sub>2</sub> )	3,3	8.6	5.9	0.3
1962 to		e ride tr (F) (r	0.6 9.2	1	}	
water year October		Chloride (Cl)	17	15	16	0.5
ater yea		bon-Sulfate ate (SO <sub>4</sub> )	82 87	99	99	2.3
	į	ate (CO <sub>3</sub> )	0	1	1	1
million,	Bi-	car- bon- ate HCO <sub>2</sub> )	145	102	133	4
s per	ŕ	tas- sium (K)	7.0	:		1
Chemical analyses, in parts per		Sodium (Na)	31 30	20	21	7.0
lyses,	Z	nag- ne- sium (Mg)	20 21	16	18	0.4 0.02 1.0 0.6
al ana		Cal- ctum (Ca)	32 34	28	33	1.0
Chemic		Iron (Fe)	0.36	0.57	0.65	0.02
		Silica (SiO <sub>2</sub> )	15 16	12	91	0.4
		Mean discharge (cfs)	15.1 10.3	!	12.9 16	1
		Date of collection	Aug. 1-31, 1963. Sept. 1-30	Weighted aver- age	Time-weighted average	Tons per day

	I
1963	
7	١
September	
ç	l
1962 to	-
October	-
year	
water	
water,	
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(°F)	
Temperature	The second secon

									1		1	1		1			-	Ì				l		l	l		l			Ī	
										- 1	- 1			ä	Day																Aver-
1 2 3 4 5 6 7 8 9 10 11	3 4 5 6 7 8 9 10	4 5 6 7 8 9 10	5 6 7 8 9 10	6 7 8 9 10	7 8 9 10	8 9 10	9 10	ន		1	77		13 14	4 15	2 16	5 17	7 18	119	8	21	22	23	24	22	56	27	28	53	ಜ	31	age
53 56 53 58 56 54 56 55 55	56 53 58 56 54 56 55 55	53 58 56 54 56 55 55	58 56 54 56 55 55	56 54 56 55 55	54 56 55 55	56 55 55	55 55	55	г	l٠	52	Н	$\vdash$	Г	┪	⊢	┢	⊢	⊢	46	43	40	36	34	34	38	37	38	36	36	48
36 37 34 34 33 32 33 34 34 34 35	34 34 33 32 33 34 34 34	34 33 32 33 34 34 34	33 32 33 34 34 34	32 33 34 34 34	33 34 34 34	34 34 34	34 34	34		10	36	34	36	35	34	33	34	33	33		-	32	33	34	34	35	34	34	35	1	34
38 38 32 32 33 33 33 33	38 38 32 32 33 33 33 33	38 32 32 33 33 33	32 32 33 33 33 33	32 33 33 33 33	33 33 33 33	33 33 33	33 33	33		OI.	35	1	!	1	-	-	-	!	!	1	;	1	!	1	ŀ	1	1	1	1	1	!
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32							1	1	-		!	-	!	:	1	1	:	1	1	-	!	1	ļ	ì	;	1	ŀ	ł	ļ	1	!
32						1	1	1	_		1	-	-	<u> </u>	-	-	-		1	;	1	!	1	1	i	ł	ŀ	1	34	1	;
32 32 34 35 40 38 36 35 43	32 34 35 40 38 36 35 43	34 35 40 38 36 35 43	35 40 38 36 35 43	40 38 36 35 43	38 36 35 43	36 35 43	35 43	43								_						44	47	48	20	54	52	46	39	1	42
55 50 53 54 48 58 58 61 57 55 57 66 66 66 70 73 68 66 63 67 64 56 53	53 54 48 58 58 61 57 55 70 73 68 66 63 67 64 56	73 68 68 61 57 55	48 58 58 61 57 55 68 66 63 67 64 56	58 58 61 57 55	58 61 57 55	61 57 55	57 55	55		~ ~	49	59	46	3 47	56	55.5	53	48	47	46	48	52	59	92	59	59	52	55	63	28	6 24
68 68 73 76 79 74 74 73 78	68 73 76 79 74 74 73 78	73 76 79 74 74 73 78	76 79 74 74 73 78	79 74 74 73 78	74 74 73 78	74 73 78	73 78	20 00			; 5											75	73	74	26	74	70	. 89	89	67	72
69 70 72 76 78 73 72 72 73 72 65 6	72 76 78 73 72 72 73 72 65	76 78 73 72 72 73 72 65	78 73 72 72 73 72 65	73 72 72 73 72 65	72 72 73 72 65	72 73 72 65	73 72 65	72 65	65	_	80	99	99	8 67	19	19	09	61	89	65	99	69	99	65	63	64	63	99	61	59	29
64 65 64 67 65 61 65 67 68	65 64 67 65 61 65 67 68	64 67 65 61 65 67 68	67 65 61 65 67 68	65 61 65 67 68	61 65 67 68	65 67 68	67 68	68	$\neg$	_	9		_	_	-		_		_	_		23	55	29	22	22	22	22	54	1	61

### STREAMS TRIBUTARY TO LAKE SUPERIOR -- Continued

### 4-160, PARTRIDGE RIVER NEAR AURORA, MINN.

LOCATION. --At gaging station at highway bridge, 1,000 feet downstream from Second Creek, 2.5 miles east of Aurora, St. Louis County, and 2.8 miles upstream from

DRAINAGE AREA, -- 156 square miles.

EXTREMES, 1956 to September 1959, July 1960 to September 1963.

Where temperatures, April 1956 to September 1969, July 1960 to September 1963.

EXTREMES, 1962-63.—Dissolved colide: Maximum, 192 ppm Peb, 11 to Mar. 6 minimum, 100 ppm June 1-26, 28-30.

Hardress: Maximum, 111 ppm Peb, 11 to Mar. 6; minimum, 45 ppm June 1-25, 28-30 minimum (1957-69, 1960-63).

Hardress: Maximum dally, 307 mirronhos Mag. 17 minimum dally, 99 mirronhos June 2. 28-30.

EXTREMES, 1960-63.—Dissolved solids: Maximum (1960-63), 120 ppm Peb, 11 to Mar. 6, 1963; minimum (1957-99, 1960-63), 1960-63. Dissolved solids: Maximum (1960-63), 197 ppm Mar Peb, 11 to Mar. 6, 1963; minimum (1957-99, 1960-63), 197 ppm Mune 1117, 1958.

Hardress: Maximum (1960-63), 197 ppm Peb, 11 to Mar. 6, 1963; minimum (1957-99, 1960-63), 197 ppm Mune 1117, 1958.

Hardress: Maximum (1960-63), 197 ppm Peb, 110 minimum dally (1957-99, 1960-63), 30 mirronhos July 29, 1963; minimum [1957-99, 1960-63], 30 mirronhos July 29, 1963; minimum [1957-99, 1960-63], 1960-63

Chemical analyses, in parts per million, water year October 1962 to September 1963

1	Col-	140	140	110	140	70		30 20 20	70 75 95 90
	Hď	6.9	6,6	7.0	6.7	7.5	7.5	. e. e.	8.00 F.0
Specific	duct- ance (micro- mhos at 25°C)	188	188	168	177	231	202	208	165 126 115 131 200
8;	dum ad- Borp- tion ratio			0.3		4.		- 0 4	44400
ress CO <sub>3</sub>	Non- car- bon-	21	23	17	21	22	16	338	31 23 18 17 18
Hardness as CaCO <sub>3</sub>	Cal- clum, Mag- ne- sium	78	79	70	73	100		72	
Dissolved solids (residue at 180°C)	Tons per day			10.3		7,13	1.95	35.9	18.8 34.6 36.7 27.3
Dissolved solids esidue at 180°	Tons per acre- foot	0.21	.21	.18	.20	. 24	22.	119	16 14 14 16
Dis: (res1	Parts per million	156		136		175	157	175 141 128	115 101 100 119 119
	Bo- ron (B)	1		0.02		1		40.190	11000
	Ni- trate (NO <sub>3</sub> )	2.9	3.1	1.3	3,6	1.5	2.3	14 12 8.2	33.3
	Tide	1	1	0.2	٥.	۳.	m m	117	1 1000
	Chloride r (Cl)	6.4	7.4	3.4	5.8	5.8	3.0	8.3 6.7	6.8 9.9 9.6 6.8
	Sulfate (SO.)	59	31	21	28	27	325	448 36	31 28 24 28 28
į	ate (CO)	0	0	0	0	0	000	000	00000
	car- bon- ate (HCO <sub>3</sub> )			65		95		4 4 4	
é	For shum (K)	1		1.6		2.0	2.0	3.1.	1.6
	Sodium (Na)	A9.3	AIO	6,5	7.5	8.8	7.2	A11 8.1	A6.9 A6.9 5.7 5.7
	mag- ne- stum (Mg)	8.0	6.8	7.9	8.7	11	9.8	9.0 8.4	6.5.9 0.4.9 0.2.0
	Cal- ctum (Ca)	18	17	15	15	22		245	10112
	Iron (Fe)	1.4	1.4	1.2	1.2	1.3			.46 .33 .42 .37
	Silica (SiO <sub>2</sub> )	11	12	13	77	41	116	7.7	6.6
	Mean discharge (cfs)	30.8	26.4	28	23.4	15.1 14	4.6.	250. 94.46.	60.7 127 136 85 85
	Date of collection	Oct. 1-31, 1962.	Nov. 1-28, 30	Nov. 29.	Dec. 1-24	1963	Jan. 18-Feb. 10. Feb. 11-Mar. 6	Apr. 1-17	Apr. 19-30 May 1-31 June 1-26, 28-30 June 1-27

S Calculated Na plus K, reported

STREAMS TRIBUTARY TO LAKE SUPERIOR -- Continued

4-160. PARTRIDGE RIVER NEAR AURORA, MINN .-- Continued

1		Col- or	11		1	1
		Hq	235 6.9 263 7.0	170 6.6	203 6.7	ı
	O)	duct- ance (micro- mhos at 25°C)				1
	å,	ad- ad- gorp- tion ratio	8.	0.5	0.5	ł
		Non- car- bon- ate	22	24	24	1
	Hardness as CaCO,	Cal- cium, Mag- ne- sium	97	64	88	1
inued	Dissolved solids (residue at 180°C)	Tons per day	18.8	17	1	1
Cont	Dissolved solids esidue at 180°	Tons per acre- foot	. 22	0.18	1	ł
ber 1963	Dis (resi	Parts per million	165	129	150	1
eptem		Bo- ron (B)	.08	1	- 1	1
to S		Ni- Frate (NO <sub>3</sub> )	.3 4.0	4.6	4.3	9.0
1962		Fluo- Ni- ride trate (F) (NO <sub>3</sub> )	.4	1	1	
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued		Chloride (Cl)	9.2	6.0	6.8	0.8
ater yea		Car- bon-Sulfate ate (SO <sub>4</sub> )	38	30	32	3.9
w, w		ate (CO)	00	1		1
m1111	BI-	car- bon- ate (HCO <sub>3</sub> )	77 85	49	67	9
s per	,	tas- sium (K)	3.4	1	-	1
in part		Sodium (Na)	15	9.1	10	1.2
lyses,		Mag- ne- sium (Mg)	21	7.2	0.6	6.0
al ana		Cal- cium (Ca)	17 20	14	17	1.1 0.10 1.8 0.9
Chemic		Fe)	42.2 9.7 1.3 23.2 11 .68	0,75 14	47.6 11 1.0 17	01.0
		Silica (SiO <sub>2</sub> )	9.7	8,3	11	1.1
		Mean discharge (cfs)	42.2	1	47.6	1
		Date of collection	Aug. 1-31, 1963. Sept. 1-30	Weighted aver-	Time-weighted average	Tons per day

		87
		27
		26
		25
က		24
196		23
mber		22
epte		21
to S		20
emperature (°F) of water, water year October 1962 to September 1963		3 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
er 1		18
ctob		17
ar o		91
r ye	Day	15
wate		14
er,		13
wat		12
) of		11
(°F		10
ture		6
era!		8
Теп		7
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		4

Aver-	<b>8</b>	37	111	46 58 70	75 69 62
	31	811	111	62	69
	8	8 6 1	111	44 65 79	70 64 59
	59	341	111	84 80 80 80	72 68 56
	28	37	111	55 56 81	73 65 58
	27	38	111	57 62 76	76 66 58
	26	37	111	52 62 78	78 65 58
	25	36	111	52 63 77	76 69 62
	24	38	111	52 62 78	77 69 56
	23	33	111	47 56 70	78 73 54
	22	33	111	45 52 70	81 68 57
	21	48 34 	111	44 49 66	76 70 54
	07	36	111	47 50 67	76 71 61
	19	848	111	45 53	73 63
	18	1 36	111	50 58 71	75 63 64
	17	3 30	111	45 70	70 63
	16	38	111	52 60 65	71 61 63
Day	15	38	111	55 52 67	70 72 60
	14	38 :	111	48 51 69	558
	13	37	111	527	75 67 57
	12	32 33	111	56	72 70 61
	11	33	111	44 60 59	73 68 69
	10	32 33	111	46 60 61	82 69 71
	6	38 38 37	111	42 62 68	78 74 70
	<b>∞</b>	37 32	111	42 64 70	78 75 67
	4	36	111	44 60 68	76 76 62
	9	34 8	111	45 62 70	82 74 67
i	2	32	111	38 54 71	78 79 69
	4	39 88	111	35 74	75 78 69
	3	98 4 42	111	34 58 72	74 74 68
	7	38 41	188	34 53 68	71 72 67
	1	62 43	111	38 57 68	80 72 68
The state		October November December	January February	April May	July August September

STREAMS TRIBUTARY TO LAKE SUPERIOR -- Continued

4-165. ST. LOUIS RIVER NEAR AURORA, MINN.

Date of Cale   Discharge   Silica   Min.   From gate   Cale   Mar.   Mar.   Cale   C					,	r											
Carried   Carried   Alia   A			경	ğ		120	110	i	20	20							
Main column   Carlo   Main				E		L	7.2	7.7	7.6	7.6	7.2	9.9	8.9	6.9	7:1	9	7
Main of the of   Discharge Silica mi-   Iron   Rab   Cal-   Rab   Society   Rab   Cal-   Rab		Specific conduct-	ance	mhos at	(D_62	126	138	156	199	219	165	86	87	73	80	142	79
Author (cfe) Silica mi- iron ga- claim Sium (fr) may sim		umpog	ad-	tion	ratto	0,2	1	87	۳.	٦.	4.	~	۳.	2.	٥,	67	. 2
Mate of Discharge Stilica mil- iron gra- Cal- ne- Sodium boase at Solution (cfs) (Sto), num (re) nees crim sum (va) sim boase at Solution (cfs) (Sto), num (re) nees crim sum (va) sim boase at Solution (cfs) (Sto), num (re) nees crim sum (va) sim boase at Solution (cfs) (Sto), num (re) nees crim sum (va) sim boase at Solution (cfs) (Sto), num (re) nees crim sum (va) sim boase at Solution (cfs) (Sto), num (re) nees crim sum (va) sim boase at Solution (cfs) (sto), num (re) nees crim sum (va) sim boase at Solution (cfs) (sto), num (re) nees crim sim (va) sim boase at Solution (cfs) (re) (sto), num (re) nees crim sim (va) (re) (re) (re) (re) (re) (re) (re) (re		ness CO,	-uoN	car- bon-	ate	13	13	11	6	19	22	16	5	11	6	œ	S
Mate of Discharge Silica mi- iron gra- Cal- ne- sodium tas- car- bon- solitate Chicage Chicage Cal- ne- sodium tas- car- bon- solitate Chicage Chicage Chicage Chicage Chicage Chicage Chicage Silica mi- iron gra- car- ne- sodium tas- car- bon- solitate Chicage Ch		Hard as Ca	Cal-	cium, mag-	nestum	57	9	20	91	104	28	38	34	33	38	9	38
Marcor   Allection   Cris   Allection   Allection   Allection   Calc	er 1963	Dissolved	solids	(residue at 180°C)		116	121	134	145	167	121	91	87	98	94	117	79
Marcor   Allection   Cris   Allection   Allection   Allection   Calc	eptemb		Boron	ê			1	ł	.04	!	1	92.	;	[	.02	80	.07
Marcor   Allection   Cris   Allection   Allection   Allection   Calc	to S		ż	(NO,)		1.5	!	1	1,4	ŀ	1	3,3	. !	1	1.1	-	4
Marcor   Allection   Cris   Allection   Allection   Allection   Calc	r 1962		Fluo-	F)		0.3	1	1	87	1	ł	۲,	1	ŀ	.2	67	. ~
Marcor   Allection   Cris   Allection   Allection   Allection   Calc	r Octobe		Chloride	<u>0</u>		1,6	2.2	2,5	3,3	3.5	6.9	2,1	2.9	1.8	1.8		
Marcor   Allection   Cris   Allection   Allection   Allection   Calc	water yes		Sulfate	Gog)		15	18	16	12	20	56	18	16	14	14	17	7.8
Chemical analyses, in parts per literion (cfs) (SiO <sub>4</sub> ) num (Fe) ness (clm sium (Na) sium bleetton (cfs) (SiO <sub>4</sub> ) num (Fe) ness (clm sium (Na) sium bleetton (cfs) (SiO <sub>4</sub> ) num (Fe) ness (clm sium (Na) sium bleetton (cfs) (SiO <sub>4</sub> ) num (Fe) ness (clm sium (Na) sium bleetton (cfs) (SiO <sub>4</sub> ) num (Fe) ness (clm sium (Na) sium bleetton (cfs) (SiO <sub>4</sub> ) num (cfs) ness (clm sium (Na) sium bleetton (cfs) (SiO <sub>4</sub> ) num (cfs) (cfs) (num tas-children) (cfs)		Car-	-uoq	(CO)		0	0	0	0	0	0	0	0	0	0	0	0
Allection (cfs) (SiO <sub>2</sub> ) num (Fe) (Fe) (Ann. (Cfs) (SiO <sub>2</sub> ) num (Fe) (Fe) (Ann. (Cfs) (Cfs) (Ann. (Fe) (Cfs) (Cfs) (Ann. (Fe) (Cfs)	r mill	Bi-	car-	bonate (HCO,)		54	57		•	104	44			27	32		
Allection (cfs) (SiO <sub>2</sub> ) num (Fe) (Fe) (Ann. (Cfs) (SiO <sub>2</sub> ) num (Fe) (Fe) (Ann. (Cfs) (Cfs) (Ann. (Fe) (Cfs) (Cfs) (Ann. (Fe) (Cfs)	ts pe	-0 <b>d</b>	tas-	Sium (K)		1,3	1	ŀ	1.8	1		,,					
Allection (cfs) (SiO <sub>2</sub> ) num (Fe) (Fe) (Ann. (Cfs) (SiO <sub>2</sub> ) num (Fe) (Fe) (Ann. (Cfs) (Cfs) (Ann. (Fe) (Cfs) (Cfs) (Ann. (Fe) (Cfs)	, in par		Sodium	(gg)			A 3	A 4	S	က	₹		¥	¥			
Allection (cfs) (SiO <sub>2</sub> ) num (Fe) (Fe) (Ann. (Cfs) (SiO <sub>2</sub> ) num (Fe) (Fe) (Ann. (Cfs) (Cfs) (Ann. (Fe) (Cfs) (Cfs) (Ann. (Fe) (Cfs)	alyses	Mag-	ne-	Sium (Mg)		9*9	6.1	1	8.2	!				1	4.3		
Mate of Discharge Silica mil- from thetton (cfs) (SiO <sub>4</sub> ) num (Fe) (Alu- from thetton)			Cal-	(Ca)		12	14	1	23	1	13	8.2	- 1	1	8.2	- 2	7.6
Mate of Discharge Silica mi- Ir (dds) (SiO <sub>4</sub> ) mm (F (dds) (SiO <sub>4</sub> ) mm (F (dds) (dds	Chemi	Man-	8a-	(Mn)		1	!		ċ	1	-	-		1	_		
Mate of Discharge Silica (Gfs) (SiQ <sub>1</sub> )  27, 1962 (Gfs) (SiQ <sub>2</sub> )  29, 1963 (Gfs) 11  29, 1963 (Gfs) 11  10, 1963 (Gfs) 11  11, 1963 (Gfs) 11  11, 1963 (Gfs) 11  12, 1963 (Gfs) 11  13, 1963 (Gfs) 11  14, 1963 (Gfs) 11  15, 1963 (Gfs) 11  18, 1963 (Gfs) 11  18, 1963 (Gfs) 11  19, 1964 (Gfs) 11  19, 1965 (Gfs) 11  19,			Iron	(Fe)		1.2	1:1	!	.87	1.0	1	.45	. 45	ì	.42	73	. 65
Mate of Discharge Si llection (cfs) (3) 27, 1962 63.3 1 29.0 11. 15.4 1963 223 223 224 27 28.6 28.5 9 85.9 65.9 68.5 9		Alu-	i	E III													
Mate of Disc. 27, 1962 29, 1963. 11. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			Silica	(\$10°)					_		1	5,5	ł	į	5.1	8	7.1
Main and a .			Discharge	(cfs)		73,3	63,3	36.0	29.2	15.4	151	223	202	354	214	5.18	
			Date of	collection		27,	53	4,			Mar. 29	Apr. 18	Apr. 26	June 4		Aug. 4	

A Calculated Na plus K, reported as Na.

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150

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STREAMS TRIBUTARY TO LAKE SUPERIOR -- Continued

4-170. EMBARRASS RIVER AT EMBARRASS, MINN.

LOCATION. --At gaging station at highway bridge at Embarrass, St. Louis County, 70 feet upstream from railroad bridge. DRAIMAGE AREA.-93, 8 square miles. RECORDS AVAILABLE.--Chemical analyses: April 1956 to September 1959, July 1960 to September 1963 (discontinued). Water temperatures: April 1956 to September 1957.

	L	U				Ľ			••			_	ĭ	ï		H
			핁			7.5	7.6	7:	7.4	6.3	71 6.4	6.9	7.1	6.9	6.9	6.9
	Specific conduct-	ance	(mtcro-	mhos at	22°C)	132	146	187	208	72	7.1	68	63	72	92	06
	Sodium	ad-	Borp-	tion	ratio		0.2	۲:	25.	٦.	1	2.	63.	63.	.2	.2
	Hardness	Non-	car-	-iioq	ate	6	9	n	4	œ	12	10	6	10	9	8
	- "	Cal-	ctum,	mag-	nestum	56	89	68	97	26	28	28	30	38	46	44
er 1963	Dissolved	solids	(residue	at 180°C)		111	123	149	145	63	71	82	88	103	109	106
eptemb		щ	æ			1	0.03	1	-	.05	i	1	1	• 04	.03	.02
to S		ż	trate	o S			1.0 0.	1	.5	3.9	1	1	1	1.4	۰.	۲.
r 1962			ride	Œ		1	0.2	i	٠,	۰.	1	1	!	۳.	۳.	۳.
Chemical analyses, in parts per million, water year October 1962 to September 1963		Chloride	<u></u>			L	1.8	4.		1,6				1.8		
ater yea		υ	(°08)			13	0.6	8.2	9.2	8.6	14	12	11	11	8.5	8.0
lon, v	Car-	-uoq	ate	<u>ල</u>		0			0		0	0	0	0	0	0
r m111	늄	car-	bonate	(HCO) (CO)		57	26			22		22	56	34	49	44
s pe	Po-	tas-	Bium			-	1.1			4.0		1	1	4.	1.1	
in par		Sodium	(Na)			A 3,5	3,7				A 2.4	A 2.6	A 2.6	2.3	2	2,7
lyses	Mag-	-au	8 turn	(Mg)		4.5	5.6	!	7.2	2.1	ł	1	1	3.7		
al ana		Carl-	cium	(Ca)		15	18	1	22	6.9	1	1	ì	9.2	14	12
Chemic	Man-	ga-	nese	(JAKIn)							00.0					
		Iron	(Fe)			1.4	1.5	1	1.8	.68	.51 0.0	.58	1	.92	2.1	1.9
	Alu-	#i-	num	₹												
		Silica	(810,				19	-	22	6.1	ŀ	!	i	7.9	12	13
		Discharge	(cfs)			12.0	3.7		1.4		7.67		85.7	48,3		
		Date of	collection			Nov. 28, 1962	Jan. 4, 1963.			Mar. 29	Apr. 17	Apr. 24	June 4	June 27	Aug. 3	Sept. 4

A Calculated Na plus K, reported as Na.

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 Mindes Reservoir. and 3.2 miles upstream from Midway River.
DEALHAGE REEK.--3 430 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: July 1958 to September 1959, July 1960 to September 1963.

		Col-	ō			6	110	ŀ	!	100	ł	110	6.9	160	160	140	150
		-	핁			6.7	7.2	7.3	2.0	7.6 1	7.1	5.5	6.9	6,9	7.0	7.2	7.0
	Specific conduct-	ance	(mtcro-	mhos at	(၁ <b>နွ</b>	202	214 7.2	226	270	279	277	153	183	134	178	241	272 7.0 150
	Sodium	-br	Borp-	tion	ratio	0.3	4.	4.	4.	.2	ĸ		e,	8	۳,	4	
	ness 1CO,	Non-	car-	-uoq	ate	31	32	40	47	46			28			30	39
	Hardness as CaCO,	Cal-	clum,	mag-	nesium	88	91	96	114	126	110	64	80	7	œ	105	113
r 1963	Dissolved	solids	(residue	at 180°C)		172	177	196	240	232	210	141	160	158	159	193	215
ptembe		Boron	æ			0.02		1	60.	!	i	91.		ŀ	90.		01.
to Se			trate	_		L	1.3	1	1.6	1		1,0	!	!	1.6	1.2	3.0
r 1962		=	196	E		0.3	۳,	!	4.	١	1		. !	;	٠.		4.
water year October 1962 to September 1963		Chloride	<u>0</u>			12	14	16	21	18	33	7.9	9.2	8,1	9.2	16	18
vater yea		Sulfate	(80)			23	_			33	g	21			22		30
	Car-	-uoq	ate	දු		l°	0	0	0	0	-	0	0	0	0	0	0
mil11	Pi-	car-	bonate	CONT.			72				å	10.00	64	29	69		90
ts per	<b>P</b> 0-		_	8		ı	1,5				ļ	3.1		1	1.0		1.7
analyses, in parts per million,		Sodium	(RA)				8.0			A6.2	A12				6,2		Ħ
llyses,	Mag-	ne-	8 turn	(Mg)		6.2	6.4	1	5.2	!	6.7	4.6	ŀ	!	6,1	7.3	8.0
		<del>-</del>	Clum	(S)		25	56	;	37	;	33	00	1	1	22	30	32
Chem1cal	Man-	<b>63</b>	nese	SE FE		-	i	!	0.01	!	1	•		1	1	1	ł
		Iron	(Fe			0.56	ĕ.	i	.67	.68		4	.60	-	.72	1.1	1.5
	Alu-	늄	umu	₹							_						
			900			1.7	7.4	!	9	ł	ł	8.9	1	į	7.0	8.6	8.7
		Discharge	(cfs)			1	785						1850	-	1660	1160	753
		Date of	collection			Oct, 24, 1962	Nov. 26	Jan. 2, 1963.	Jan. 28	Feb. 25	Mar. 25	Apr. 17	Apr. 22	June 7	June 28	July 31	Sept. 5

A Calculated Na plus K, reported as Na.

STREAMS TRIBUTARY TO LAKE SUPERIOR

4-310. BLACK RIVER NEAR BESSEMER, MICH.

LOCATION.—"Imperture recorder at gaging station, 450 feet downstream from bridge on county highway, 500 feet downstream from DNAINME. Property Mill Creek, and 2.5 miles north of Bessemer, Gogebic County.

NAINME.——200 square miles.

RECORDS ANAILABE.——after temperatures: October 1964 to September 1963.

EXTREMES, 1962-63.——Water temperatures: Maximum, 82°F num 30, July 11, 23, 26, 27; minimum, freezing point during December to

March. EXTEREMES, 1954-63. --Water temperatures: Maximum, 83°F Aug. 2, 1987; minimum, freezing point on many days during winter months. REMARKS. --Complete ice cover during winter months.

Temperature (°F) of water, water year October 1962 to September 1963

Aver-	age	64	35	34	32	32	32	4 4 2 2	50	63	76 68	0,4	9
	31	38	11	32	32	11	33	11	66	11	71	62 56	1
	30	38	38	32	32	1 (	33	47	65	82	17 89	63 59	5.5
	29	38	38	32	32	11	32	5.5	62 54	78	77	400	53
	28	38	35	32	32	32	32	7.4	61	78	78	61	56
	27	38	35	32	32	32 32	32	4.9	57	44	82	61	53
	26	37	35	32	32	32	32	53	53	78	982	59	61
	25	37	35	32	32	35	32	64	50	74	74	65	56
	24	704	35	32	32	32	32	0.4	52	43	81	63	57
	23	452	35	35.5	32	32	32	97	2 4	63	71	65	55
	22	2.4	35	32	32	32	32	2,6	8 4 3	99	79	69	57
	21 2	124	35	32 3	323	32 3	32 3	4.4 4.4 4.4	4 6 4	563	69	12 9	57
	50	64	20.00	32	22	32	333	53	50	575	17	1.4	19
	19	51 4	34 3	32 3	32 3	32 3	32 3	# 4 4 4	53 5	9 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	76 7	67 61	62 6
	1 8												65
	17 18	53 51 50 50	36 35	32 32 32 32	32 32	32 32 32 32	32 32 32 32	52 47 43	57 56 55 53	68 68	77 75	59 59	63
Α.													
Day	91	1 61	36	32 32	32	32 32	32 32	5 50	5 47	58	4 62	71 68	63
	15	61 57	36	32	32	32	32	5.1	5.5	58	8 4		9
	14	52	36	32	32	32	32	45	0.84	5 5	23	69	57
	13	53	36	32	32	32	32	43	50	€. €.	8 4	6.5	9
	12	53.4	36	32	32	32	32	42	5 6 4	52	71	72	62
	Π	53	8 6	32	32	32	32	39	50	54	75	75	65
	01	54	33	32	32	32 32	32	37	55 49	35	77	74	65
	6	4.6	33.4	32	32	32	32	39.1	55	8 4	75	76	65
	8	5.5	34	32	32	32	32 32	3 6	61 56	6 9	75	9 69	\$
	-	5.5	35 45	34	32	32	32	39	52	69	77	78,	62
	9	53	36	37	32	35	32	41	57	73	78	78	63
	5	53	35	37	32	32	32	35	51	76	9 4	20	61
	4	52	37	£ 3 4 2	32	32	32	37	53	74	74	76	9
	3	53	38	611	32	32	32	36	53	71	73	<b>*</b> 2	9
	2	52	38	104	32	32	32	35	51	69	75	73	63
	-	53	38	39	32	35	32	334	6 4	63	82	73	65
		11	::	11	- ; ;	11	11	- : :	H	::	11	1 1	-:
4	1	c -		e .	8 8	88		E E	Maximum . Minimum .	une Maximum Minimum			_
Month	i i	October Maximum Minimum	Maximum	Maximum Minimum	muary Maximum Minimum	Maximum Minimum	arcn Maximum Minimum	pril Maximum Minimum	nim	axim	uly Maximum Minimum	August Maximum Minimum	September Maximum
		October Maxin Minim	ΣΞ	ZZZ	January Maxin Minim	M. M.	March Maxi Minin	April Max Min	ŔΫŸ.	May Min	Ma	Aug.	Sept Ma

### STREAMS TRIBUTARY TO LAKE MICHIGAN

4-460. BLACK RIVER NEAR GARNET, MICH.

LOCATION. --Temperature recorder at gaging station, 10 feet upstream from highway bridge, 15 feet downstream from unnamed tributary encoring from right, 3.5 miles upstream from Lake Withigan, and 4 miles southwest of Garnet, Mackinac County.

DRAINGE RESA. --28 square miles, approximately.

RECORDS AFAILABLE. -- water temperatures: Orchoer 1981 to September 1963.

EXTREMES, 1962-63. -- water temperatures: Maximum, 64°F June 03; minimum, 33°F on many days during December and January.

EXTREMES, 1992-63. -- water temperatures: Maximum, 68°F July 21, 22, 1952; minimum, freezing point on many days during winter months.

REMARKS. -- River does not freeze over.

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

:	a												
Aver-	age	8 4	38	35	34	9 % 4 4	36	44	1 1	1 1	59	54	49
	31	42	11	33	34	11	35.8	11	11	11	56	51 48	1
	30	707	38	333	34	11	38	7.3	11	57	57	55	4
	59	1,0	38	33	34	11	37	50	11	63 56	2 6	5 6	4
	28	141	38	33	34	34	35	50	11	563	61 58	50	9
	27	t 0 4 0	38 38	66	4 4	3 4	38	4 4 0 70	11	54	63	50	9
	26	39	38	33	3.4	34	36	9 4	11	539	55	52	5
	25	39	37	33	4 4	34	38	4.5	11	59	55	52	9
	24	6.1	37	33	34	34	3.5	43	11	58	61	54	8 4
	23	2 4	38	333	3, 4,	3,5	3,8	47	11	50	62 55	53	47
	22	3 4	38	33	4 4	34	35	42	11	56	61	55	47
	21	23	38	333	34	34	3.4	<b>4</b> 7	11	50	59	50	8 9
	20	50	38	34	4 4	34	35	4 <b>t</b> 4	11	50	61	50	ç
	19	51	37	35	3,4	3 4	# # #	4 4	11	53	57	53	5
	82	50	38	35	34	34	36	4.5	11	51	52	52	2
	11	52	38	3.4	34	34	36	45	11	58	5.55	52	9
Day	91	52	0,0	33	3 4	34	36	6 4	11	52	58	50	9
	15	53	39	333	34	34	36	4.1	11	57 51	53	50	9
	4	0.4	39	33	3.4	3.4	3.6	43	48	50	5.4	53	,,
	13	0.8	38	9 9	4 4	3 4	35	45	64	53	57	52	;
	12	51	3.88	333	4 4	34	35	104	64	55	53	53	9
	=	51	3 38	8 8	4 4	4 4	3.5	0.80	8 4	23	51	52	9
	9	0.4	38	33	4 4	34	35	38	52	11	58	52	9
	6	50	33	3 %	3 %	2 4	4 4	39	52	11	58	54	2
	80	52	39	35	33	3.4	35	39	50	11	58	52	9
	-	52	38	3 %	9 9	5. 4	3.5	38	8 4	11	55	5.4	2
	9	51	388	36	88	3.5	3.5	3 38	50	1:	58	54	9
	2	2.2	38	3 6	88	* *	3.4	44	8 6	H	51	52	9
	4	25	39	0 0	33	3.4	3.5	ล์ล์	45	11	51	54	0
	65	0,00	77	3 %	88	4 4	50 E	5.4	L 4	11	52	5 50	2
	2	6.4	41	3.9	9.9	4 4	5. 4.	3.5	43	11	560	5.8	9
	-	8 9	45	3 %	9.8	4 4	4 4	33.7	2.4	11	8 83	6 4	2
	Month	11	11		wn	Maximum	Minimum	11		maximum	ıly Maxımum Minimum	ngust Maximum Minimum	ptember
	ž	October Maximum Minimum	Novem Maxi Minu	December Maximun Minimum	January Maximu Minimu	Maxi	Maxi Minn	April Maximum Minimum	Maximum Maximum Minimum	June Maxi Minii	July Maxi Minit	August Maxir Minin	September

## STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

### 4-579. BLACK RIVER NEAR REPUBLIC, MICH.

LOCATION. --At gaging station 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 1963.

Solience records: April 1962 to Septembor 1963.

EXTREMES 1962-63 — Where temperatures 1963.

EXTREMES 1962-63 — Where temperatures is septembor 1963.

Sediment concentrations: Maximum daily, 20 ppm Mar. 31: minimum daily, 1963 to non many days during October. Novembor, January to March, May, July to Septembor.

Sediment concentrations: Maximum daily, 20 ppm Mar. 31: minimum daily, 1963; minimum daily, days during October. Novembor, Maximum daily, 1963; minimum, freezing point on many days during winter months.

Sediment concentrations (1962-63): Maximum daily, 50 ppm Mar. 31, 1963; minimum daily, 1963 minimum daily, 1

Chemical analyses, in parts per million, water year October 1962 to September 1963

		Tur- bid- ity	2	œ	-	Ħ	1
	ssolved	Per- cent satur ition	101 6.7 120 11.4 84	i	ł	1	92
	Dissolved	per per 111-	11.4	1	1	Ţ	10.0
		or 1	120	80	8	06	33
		Нď	6.7	6.9	1	8.9	7.0
	Specific conduct-	ance pH Col-parts Per- (micro- pH or per cent mhos at mil-satur 150°C)	101	134	44	81	249
	두 명	as H+1		-	_	_	
2001	Hardness as CaCO,	Non- car- bon- ate	16				
	Hare as C	Cal- cium, mag- nesium	38				
יין מבער טי	Dissolved	solids (residue at 180°C)	93				1
7007	ž	rate (NO <sub>3</sub> )	8.9	8.1	ŀ	1	34
TAGE		F)	0.2				
Chemical analyses, in parts per million, water year october 1902 to September 1903	:	Chornes ride trate (residue Cal- Non- lity (micro- poster) (Cl) (F) (NO) at 180°C) ctum, car- as imbos at mestum ate   1.25°C)	3.0 0.2	4.0	1	3.0	8.0
m, water		Sulfate (SO <sub>4</sub> )	19	20	!	10	24
111	å.	g at S	10	0)	_	01	_
ber	H 2	bon- ate ate (CO <sub>3</sub> )	26				ı
RECS		tas- sium (K)	1.4	!	ŀ	!	11 4.9
es, in p		Sodium (Na)		;	1	1	11
LURINS	Mag-	sium (Mg)	3.5				
ICAL P	[8]	cium (Ca)	9.5		_	_	
Cne	Man-	ga- nese (Mn)	0.84 0.05	1	1	.15	-
-		(Fe)	0.84	1	1	.64	1
	Alu-	mi- mum (Al)		_	_	_	
		Silica (SiO <sub>2</sub> )	13	1	1	31	5.7
	-	(cfs) (300) (Al) (6a)	14	9.2	105	54	
	Date	of collection	Nov. 15, 1962	Jan. 15, 1963	Apr. 5	Apr. 9	Sept. 24

STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

4-579. BLACK RIVER NEAR REPUBLIC, MICH. -- Continued

	Aver-	age	8 4 9 4	11	33	32	32	32	4 4 6 0	\$ 00 00	67	71	65 61	54
		31	39	11	32	32	11	32	11	5.0	11	99	58	11
		30	39 37	32	32	32	11	32	45	55	80	69	298	52
		59	37	32	32	32	11	32	51	61 57	75 68	72	60	0.4
		28	37	32	32	32	32	32	51	61	74	2.2	61	50
1		27	36	11	32	32	32	32	50	25	71	4 2	58	55
		26	35	11	32	32	32	32	4 4	5.2	44	74	56	55
		25	38	11	32	32	32	32	4 6 7	4 4 0	70	73	61	52
.963		24	38		32	32	32	32	45	50	6.3	74	61	52
water year October 1962 to September 1963 1 alcohol-actuated thermograph)		23	47	11	32	32	32	32	£ 7 2 7	50	66	4 6 6	99	51
que		22	4.4	11	32	32	32	32	43	64	58	73	99	53
Sept		21	44	11	32	32	32	32	4.5	25	55	72	99	55
1962 to Sept thermograph)		20	64	11	32	32	32	32	 	52	5.58	72	69	54
962 herm		19	4 4 7	11	32	32	32	32	4 4 5 0	52	62 58	70	62 56	62 57
4.5		8I	64	11	32	32	32	32	8 4	55	409	04	53	62
tobe		17	52	11	32	32	32	32	5 4	56	49	68	5.9	58
9 ct	Day	16	58	11	32	32	32	32	7 4 4	5¢ 46	65	49	56	55
year hol-		15	58	11	32	32	32	32	4 6	84 9	96	63	59	55
(°F) of water, water year October Continuous ethyl alcohol-actuated		14	50.0	11	32	32	32	32	3.9	0.04	5 4	9 4 9	58	50
wat yls		13	52	11	32	32	32	32	3.9	50	56 56	70	58	54
er,		21	5.2	11	32	32	32	32	36	64	53	0,9	99	61
of water, nuous ethy		=	5.12	11	32	32	32	32	38	50	5.8	69	66	62
to d		10	54	11	32	32	32	32	38	56	58	69	67	62 58
(°F)		6	5.4	11	32	32	32	32	36	57	07	<b>6.8</b>	71	58
ire (		œ	5 4 4	11	32	32	32	32	38	52	49	70	0.9	62 57
ratı		7	54	11	32	32	32	32	37	55	48	70	72	59
Temperature (		9	5.4	11	32	32	32	32	40 36	56	72	71	74	57
ř		5	54 52	34	36	32	32 32	32	36	50	72 70	52	72 64	58
		4	52 50	34	37	32	32	32	37	55	71	69	63	55
		3	50	37	36 35	32	32	32	37	53	6. 6.	70	70 66	52
		2	50	37	35	32	32	32	34	51	68	78	72	58
		-	50	39	32	32	32	32	32	48	66	81	0.4 4.4	58 54
			:::	]	::	11	::	1	<u> </u>	11	11	- : :		
	4400	MOIIII	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum	Maximum Minimum	April Maximum Minimum	Maximum . Minimum .	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

### 4-579. BLACK RIVER NEAR REPUBLIC, MICH. -- Continued

Suspended sediment, water year October 1962 to September 1963

charge charge charge charge charge per tration per	L		OCTOBER			NOVEMBER	1		DECEMBER	
Day   Charge   Char			Suspende	ed sediment		Suspend	led sediment		Suspend	ed sediment
2   12	- 1	dis- charge	concen- tration	per	dis- charge	concen- tration	per	dis- charge	concen- tration	Tons per day
3 12	1			0.2	15					0.
15	2	12	2	•1	15					•
5 16	3	12			13			14		•
6 14 2 1 13 2 1 18 7 7 13 1 2 1 16 2 1 16 7 8 13 2 1 16 7 10 13 2 1 16 7 10 13 2 1 16 7 10 13 2 1 16 7 10 13 2 1 16 7 10 13 2 1 16 7 10 13 2 1 16 7 10 13 2 1 16 7 10 13 7 11 13 1 7 1 14 1 7 11 4 1 7 11 13 1 7 1 14 1 7 11 3 12 19 8 9 2 1 14 1 7 11 1 3 12 19 8 9 2 1 14 2 1 11 3 13 1 7 1 14 2 1 11 3 14 9 8 9 2 1 12 2 1 10 3 14 8 9 9 7 1 1 14 2 1 10 3 15 8 9 1 7 1 16 2 1 10 3 16 8 9 2 1 1 14 2 1 10 3 16 8 9 2 1 1 14 2 1 10 3 16 8 9 2 1 1 14 2 1 10 3 17 7 9 2 7 16 2 1 10 3 18 9 1 1 14 2 1 10 3 19 6 9 2 7 16 2 1 10 3 19 6 9 2 7 16 2 1 10 3 10 6 6 3 1 14 2 1 10 3 10 6 6 4 1 12 3 3 1 9 5 3 10 6 6 4 1 12 3 3 1 9 5 3 10 6 6 9 3 1 14 2 1 9 5 3 10 6 9 3 1 12 3 3 1 9 5 3 10 6 9 3 1 12 3 3 1 9 5 3 10 6 9 3 1 12 3 3 1 9 5 3 10 6 9 3 1 11 3 1 9 5 3 10 6 9 3 1 11 3 3 1 9 5 3 10 6 9 3 1 11 3 3 1 9 5 3 10 6 9 3 1 11 3 3 1 9 5 3 10 6 9 3 1 11 3 3 1 9 5 3 10 6 9 3 1 11 3 3 1 9 5 3 10 6 9 3 1 11 3 3 1 9 5 3 10 6 9 3 1 11 3 3 1 9 5 3 10 6 9 3 1 11 3 3 1 9 5 3 10 10 2 1 11 3 3 1 9 5 3 10 10 2 1 11 3 3 1 9 5 3 10 10 2 1 11 3 3 1 9 5 3 10 10 2 1 11 3 3 1 9 5 3 10 10 2 1 11 3 3 1 9 5 3 10 10 2 1 11 3 3 1 9 5 3 10 10 2 1 11 3 3 1 9 5 3 10 10 2 1 11 3 3 1 9 5 3 10 10 2 1 11 12 3 3 1 9 5 3 10 10 2 1 11 10 3 1 9 5 3 10 10 2 1 11 10 3 1 9 5 5 3 10 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3					12	2	• 1			•
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10   13	8 • •			•1	17		•1			
11.	9	13	2	•1	16				6	
12	10	13	2	•1	15	1	7	12	5	•
12.	11	13	1	7	14	1	т	11	4	
13.	12			.1			T		3	
14 8.9 2 7 1 12 2 1 1 10 3 3 1 10 3 3 1 1 9 4 1 1 1 10 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1	13	9.8	2		13	2	• 1	11	3	
16 8.5 2 7 1 16 2 .1 10 3 3 10 3 10 9.5 3 10 10 10 10 10 10 10 10 10 10 10 10 10	4	8.9	2	•1	12	2			3	•
7.	5	8 • 9	1	7	14	2	• 1	10	3	•
17.	1600	8.5	2	7	16	2	•1	10	3	
							• 1			•
19.	18					2		10	3	
21. 6.6 4 .1 13 3 .1 9.5 3 22. 6.6 4 .1 12 3 .1 9.5 3 24. 6.9 3 .1 112 3 .1 9 .5 3 24. 6.9 3 .1 112 3 .1 9 .3 24. 6.9 3 .1 112 3 .1 9 4 25. 8.1 2 T 111 3 .1 9 4 26. 8.5 1 7 10 3 .1 9 4 27. 8.9 2 .1 10 3 .1 8.5 4 28. 10 2 .1 10 3 .1 8.5 4 29. 10 2 .1 12 3 .1 8.5 4 29. 10 2 .1 12 3 .1 8.5 4 29. 10 2 .1 12 3 .1 8.5 4 29. 10 2 .1 12 3 .1 8.5 4 29. 10 2 .1 12 3 .1 8.5 4 29. 10 2 .1 12 3 .1 8.5 4 29. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 4 20. 10 2 .1 12 3 .1 8.5 5 20. 10 2 .1 12 3 .1 8.5 5 20. 10 2 .1 12 3 .1 8.5 5 20. 10 2 .1 8.5 5	19	6.9		T		2	•1	9.5		•
12	0	6.6	3	•1	14	2	•1	9 • 5	3	
12	11.4	6.6		.1	13	3	•1	9.5	3	
123. 6.9 3 1 1 12 3 11 9 2 2 2 2 2 1 11 3 3 11 9 2 2 2 2 2 1 11 3 3 1 1 9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2							.1			
10. 6.9 3 1 1 11 3 .1 9 4 6 1 1 1	3	6.9		.1	12				3	
26. 8.1 2 T 11 3 .1 9 4  26. 8.5 1 T 10 3 .1 9 4  27. 8.9 2 .1 10 3 .1 8.5 4  28. 10 2 .1 11 3 .1 8.5 4  29. 10 2 .1 11 3 .1 8 .5 4  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 12 2 .1 13 3 .1 8 3  20. 14 8 3 3  20. 15 5 4 0.1 4.6 1  20. 7.5 2 T 5 4 0.1 4.6 1  20. 7.5 2 T 5 3 .1 4.6 1  20. 7.3 1 T 5.5 2 T 4.6 1  20. 7.3 1 T 5.5 2 T 4.6 1  20. 8 5 1 5 1 5.5 2 T 4.6 1  20. 8 5 1 5 1 5.5 3 T 4.5 1  20. 8 5 1 5 1 5.5 3 T 4.5 1  21. 8.9 5 1 5 1 5.5 3 T 4.5 1  21. 8.9 5 1 5 1 5.5 3 T 4.5 1  21. 8.9 5 1 5.5 3 T 4.5 1  21. 8.9 5 1 5.5 3 T 4.5 1  21. 8.5 5 1 5.5 3 T 4.5 1  21. 8.5 5 1 5 1 5.5 3 T 4.5 1  21. 8.5 5 1 5 1 5.5 3 T 4.5 1  21. 8.5 5 1 5 1 5.5 3 T 4.5 1  21. 8.5 5 1 5 1 5.5 3 T 4.5 1  21. 8.5 5 1 5 1 5.5 3 T 4.5 1  21. 8.5 5 1 5 1 5.5 3 T 4.5 1  21. 8.5 5 1 5 1 5.5 3 T 5 5 1  21. 8.5 5 5 1 7 4.5 1  21. 8.5 5 5 1 7 4.5 1  21. 8.5 5 7 7 4.6 1  21. 8.5 5 7 7 4.6 1  21. 8.5 5 7 7 4.6 1  22. 8.9 5 7 7 4.5 1  23. 7.5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	4		3	.1		3	•1	9		Ŧ
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Total 32 • 7 2.5 401 2.6 348.0	30	12	2		13		•1			
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1	Total	32 • 7		2 • 5	401		2.6	348+0		3.
2 7.5			JANUARY			FEBRUARY			MARCH	
2 7.5	1	7.5	3	0.1		4	т	4.6	1	т
4 7.3 2 T 5.5 3 1 T 4.6 1 7 7.5 4 1 T 5.5 5 2 T 4.6 1 7 7.5 4 1 5.5 5 2 T 4.6 1 7 7.5 5 5 1 5.5 5 2 T 4.6 1 7 7.5 5 5 1 7 4.6 1 7 7.5 5 5 1 7 4.6 1 7 7.5 5 5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 7 4.5 1 7 7 4.5 1 7 7 4.5 1 7 7 4.5 1 7 7 4.5 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	2	7.5	2	т	5	4		4.6	1	т
4 7.3 2 T 5.5 3 T 4.6 1 7.7.5 4 1 5.5 5 2 T 4.6 1 7.7.5 4 1 7 5.5 2 T 4.6 1 7.7.5 4 1 7 5.5 2 T 4.6 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 4.5 1 7 7 4.5 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	3	7.3	2		5		•1			T
6 7.3 1 T 5.5 2 T 4.6 1 1 8.5 1 8.5 1 1 5.5 2 T 4.6 1 1 8.5 1 1 5.5 2 T 4.5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4	7.3								Ţ
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8			4	•1		2	T			т
10 8 5 1 1 5.5 3 T 4.5 1  11 8.5 5 5 1 5 1 5.5 3 T 4.5 1  12 8.9 5 1 6.2 1 T 4.5 1  13 9 5 1 6.2 1 T 4.5 1  14 9 5 1 5.5 1 T 4.4 1  15 1 5.5 1 T 4.4 1  16 9 4 1 4.9 1 T 4.4 1  17 8.5 3 1 4.9 1 T 4.5 1  18 8 3 1 4.9 1 T 4.5 1  18 8 3 1 4.9 1 T 4.5 1  19 7.5 3 1 4.9 2 T 5 1  10 6.5 3 1 4.9 2 T 5 1  10 6.5 3 1 4.9 2 T 5 1  10 6.5 5 2 T 4.9 2 T 5.5 1  10 5 5 2 T 4.9 2 T 6.6 1  10 5 5 2 T 4.9 2 T 8.5 7  10 5 5 2 T 4.9 2 T 8.5 7  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 14 4  10 5 5 2 T 4.6 1 T 18 4	8	7.5		•1	5.5	2	T	4 • 5	1	T
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12	.0	8	5	•1	5.5	3	Т	4.5	1	Т
12	11	8.5	5	.1	5.5	3	т [	4.5	1	т
13					5.5	3	т	4.5		T
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6 9 4 .1 4.9 1 T 4.4 1  7 8.5 3 .1 4.9 1 T 4.5 1  8 8 3 .1 4.9 2 T 5 1  10 7 3 .1 4.9 2 T 5 1  11 6.5 3 .1 4.9 2 T 5 1  12 6 3 .1 4.9 2 T 5 1  12 6 3 .1 4.9 2 T 5 1  13 6 3 .1 4.9 2 T 5 1  13 6 3 .1 4.9 2 T 5 1  14 5.5 2 T 4.9 2 T 6.6 1  15 5.5 2 T 4.9 2 T 8.5 7  16 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 14 4  18 5 5 2 T 4.6 1 T 18 4  19 4.9 2 T 25 8			5			1	т	4 • 4		T
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5 5.5 2 T 4.9 2 T 8.5 7  6 5 2 T 4.6 2 T 11 10  7 5 2 T 4.6 1 T 14 4  8 5 2 T 4.6 1 T 18 4  9 4.9 2 T 25 8  0 5 2 T 35 12	4	5.5	2	T	4.9	2	т (	6.6	1	T
77 5 2 T 4.6 1 T 14 4 18 5 2 T 4.6 1 T 18 4 19 9 9 9 5 2 T 25 8 10 5 2 T 35 12	1				4.9	1				0.
18										
9••	7		2	<u> </u>		1 1			4	
10 5 2 T 35 12	8.0						т			
11 5 3 7 55 20										1
	1	5		<del>'</del>						3.
otal 219.0 2.2 143.7 1.0 280.0		-	-							

T Less than 0.05 ton.

### ST. LAWRENCE RIVER BASIN

### STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-579. BLACK RIVER NEAR REPUBLIC, MICH. -- Continued

Suspended sediment, water year October 1962 to September 1963--Continued

		100.	,	,	14.10		I	0.005	
-		APRIL			MAY			JUNE	
	Mean	Suspend	ded sediment	Mean	Suspen	ded sediment	Mean	Suspen	ded sediment
Day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	90	18	4.4	50	8	1.1	29	3	0.2
2	131	11	3.9	45	9	1.1	26	5	• 4
3	144 127	4	2 • 7 1 • 4	38 34	8	•9	28 30	5	•4
5	104	2	•6	30	8	• 5	26	5	• 4
- 1		1 . 1	_		7			5	
7	86 72	3 2	• 7 • 4	28 26	6	•5	27 30	5	• 4
8.	62	2	•3	38	5	.5	32	5	• 4
9	54	2	• 3	45	5	•6	35	7	• 7
10	48	3	• 4	40	5	•5	79	10	2 • 1
11	43	4	• 5	35	5	•5	103	6	1.7
12	3 7 3 2	5	• 5 • 5	30 31	5 5	•4	86 74	5 .	1•2 1•2
14	30	6	• 5	34	5	.4	86	6	1.4
15	28	4	• 3	32	5	.4	69	5	• 9
16	27	5	.4	30	5	•4	. 61	5	. 8
17	28	5	•4	27	6	•4	50	5	• 7
18	26	5	• 4	26	6	•4	41	4	• 4
19	48 60	6 5	.8 .8	25 26	2	•3 •1	57 84	5 5	.8 1.1
1							1	5	
21	50 44	5 4	•7 •5	29 28	1 1	•1	63 48	4	• 8 • 5
23	42	2	• 2	27	2	• 1	36	4	• 4
24	32 32	3 4	• 2	26 84	10	.3 2.3	29	4 4	• 3
l		1							
26	28 26	4 3	•3 •2	93 71	7 2	1.8	22 20	5 4	•3 •2
28	24	4	• 2	59	i	.2	17	8	• 4
29	29	4	• 3	50	3	•4	15	5 2	• 2
30	53	8	1 • 1	40 32	4	•4	13	2	• 1
Total	1637		24•2	1209		16.9	1340		19.4
		JULY			AUGUST			SEPTEMBER	?
1	12	2	0.1	1.6	5	т	3•1	3	т
2	9.8	2	•1	1.6	5	į į	4.0	2	T
3	8.9	2	T	1.6	4	Т	5•2	5	0.1
5	7.7 6.9	2 5	T •1	1.3	5 3	Ţ	4.9 4.0	5 7	• 1
		1		}					
6	6 • 2 6 • 2	5 5	•1	1.0	6	T T	4.0 13	5	• 1
7 8	7.7	3	•1	2.7	4	†	8.1	5	• 1
9	5.9	2	T	2.3	3	Ţ.	5 • 2	5	• 1
10	4.9	2	Т	1.7	3	7.	4.2	5	• 1
11	4.6	3	т	1.4	6	т	3.6	4	T
12	4 • 2	2	т	2.0	5	Ī	4.0	3	Ī
13	3 • 8 4 • 0	1 1	T T	3.6 4.2	5 7	7 0•1	4.0 3.6	2 2	Ť
15	3.6	1	Ť	3.4	4	T .	3.1	2	Ť
16	3.4	1	т	4.2	2	т	2.9	. 5	т
17	4.0	1 1	T	9.3	4	•1	3.1	2	T
18	4.6	2	Ť	5.5	4	•1	3.1	2	T
19	4 • 2 4 • 2	2 2	T T	4.0 3.4	2	T T	3 • 6 4 • 0	1 2	T T
i				į.					
21	3 • 8 3 • 1	2	T T	2.9 2.7	2	Ť	3 • 8	2	T T
23	2 • 4	6	Ť	2.9	5	Т	3 • 4	1	T
24	2 • 3 2 • 0	5	T	2.7	2	T T	3 • 4 3 • 2	2 2	Ţ
			T						
26	1.8	3 2	T T	2.9	5	T T	2.7	5	T T
28	1.4	3	T	2.9	2	Ť	2.4	7	T
29	1.3	3	Т	2.9	1	Т	2.7	5	Т
30	1.2 1.7	2 3	Ţ	2.7 2.9	1 2	T T	2.7		т
Total	139.4		1.1	89.6		0.9	121•4		1.3
							121•4		
rotal	uischarge	ior year	(cfs-days)						6248.8

 Total discharge for year (ofs-days)
 6248.8

 Total load for year (tons)
 81.7

 T Less than 0.05 ton.
 81.7

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-580. MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MICH.

LOCATION .--Temperature recorder at gaging station 0.5 mile downstream from County Highway 581, 6 miles southwest of Ishpeming, Marquette County, and

10 miles east of Republic.

DARINAGA REM.-128 square miles.

RECORDS ANTIABLE.—Rater temperatures. August 1961 to September 1963.

EXTREMES, 1965-63.—Water temperatures: MaxXmum, 78°F July 1, 2; minimum, freezing point during Dec. 7 to Mar. 31.

RENTEMES, 1965-63.—Water temperatures: MaxXmum, 78°F July 1, 2, 1965; minimum, freezing point on many days during winter months.

REMARKS.—Complete ice cover during winter months.

Date   Discharge Silica   Min.   Fig.   Man.   Cal.   Mag.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Cal.   Car.   Sodium   tas.   Car.   Car.   Sodium   tas.   Car.   Car.   Sodium   tas.   Car.   Car.   Sodium   tas.   Car.   Ca								
Chemical analyses, in parts per million, water ye and the parts per million, water ye are million, water ye are million, water ye are million, water ye are million, water ye are clear and water with the part of the parts of th		<u> </u>	bid-	63				
Chemical analyses, in parts per million, water ye and the parts per million, water ye are million, water ye are million, water ye are million, water ye are million, water ye are clear and water with the part of the parts of th			Col-	140	35	90	80	9
Chemical analyses, in parts per million, water ye and the parts per million, water ye are million, water ye are million, water ye are million, water ye are million, water ye are clear and water with the part of the parts of th			нd	6.9	7.1	ļ	6.8	7.0
Chemical analyses, in parts per million, water ye and the parts per million, water ye are million, water ye are million, water ye are million, water ye are million, water ye are clear and water with the part of the parts of th		Specific conduct-	ance (micro- mhos at 25°C)	82	87	72	99	93
Discharge Silica   Alu-   Iron   ga-   Cal-   Mag-   Sodium   tas-   Lith-   Car-		To- tal	ity as H <sup>+</sup> 11					
Discharge Silica   Alu-   Iron   ga-   Cal-   Mag-   Sodium   tas-   Lith-   Car-		iaco,	Non- car- bon- ate	7				
Discharge Silica   Alu-   Iron   ga-   Cal-   Mag-   Sodium   tas-   Lith-   Car-		Hare as C	Cal- cium, mag- nesium	35				
Discharge Silica   Alu-   Iron   ga-   Cal-   Mag-   Sodium   tas-   Lith-   Car-	1963	Dissolved	solids (residue tt 180°C)	78	71	ļ		;
Discharge Silica   Alu-   Iron   ga- cum sium   (Na)   Silica   Man   (Cas)   (SiO <sub>2</sub> )   Mum   (Fe)   Mag   (Cas)   (SiO <sub>2</sub> )   Mum   (Fe)   Mag   (Cas)   (Ki)   (Li)   (HCO <sub>2</sub> )   (Cas)   (Ki)   (Li)   (HCO <sub>2</sub> )   (Cas)	ember	Phos-	phate (PO <sub>4</sub> )					
Discharge Silica   Alu-   Iron   ga- cum sium   (Na)   Silica   Man   (Cas)   (SiO <sub>2</sub> )   Mum   (Fe)   Mag   (Cas)   (SiO <sub>2</sub> )   Mum   (Fe)   Mag   (Cas)   (Ki)   (Li)   (HCO <sub>2</sub> )   (Cas)   (Ki)   (Li)   (HCO <sub>2</sub> )   (Cas)	Sept	Ni-	trate (NO <sub>3</sub> )	2.1	œ.	1	1	1
Discharge Silica   Alu-   Iron   ga- cum sium   (Na)   Silica   Man   (Cas)   (SiO <sub>2</sub> )   Mum   (Fe)   Mag   (Cas)   (SiO <sub>2</sub> )   Mum   (Fe)   Mag   (Cas)   (Ki)   (Li)   (HCO <sub>2</sub> )   (Cas)   (Ki)   (Li)   (HCO <sub>2</sub> )   (Cas)	62 to	Fluo-	ride (F)					
Chemical analyses, in parts per million, water ye and the parts per million, water ye are million, water ye are million, water ye are million, water ye are million, water ye are clear and water with the part of the parts of th	tober 19	:	(C1)	0.5	1.5	1	2.0	1
Discharge Silica mi- Iron (cfs) (SiO <sub>2</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) (Al) (Al) (SiO <sub>3</sub> ) (Al) (Al) (Al) (Al) (Al) (Al) (Al) (Al	r year O		(SO <sub>4</sub> )	12	9.3	1	10	1
Discharge Silica mi- fron (cfs) (SiO <sub>2</sub> ) mm (Fe) (A1) (SiO <sub>3</sub> ) mm (Fe) (A2) (A3) (A3) (A4) (A4) (A5) (A5) (A5) (A5) (A5) (A5) (A5) (A5	wate	Cat.	Sat So			_		_
Discharge Silica mi- fron (cfs) (SiO <sub>2</sub> ) mm (Fe) (A1) (SiO <sub>3</sub> ) mm (Fe) (A2) (A3) (A3) (A4) (A4) (A5) (A5) (A5) (A5) (A5) (A5) (A5) (A5	ton,	Bi-	ate (HCO <sub>3</sub>	34	40	1	56	48
Discharge Silica mi- fron (cfs) (SiO <sub>2</sub> ) mm (Fe) (A1) (SiO <sub>3</sub> ) mm (Fe) (A2) (A3) (A3) (A4) (A4) (A5) (A5) (A5) (A5) (A5) (A5) (A5) (A5	H 1	#5	(Li)					
Discharge Silica mi- Iron (cfs) (SiO <sub>2</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) (Al) (Al) (SiO <sub>3</sub> ) (Al) (Al) (Al) (Al) (Al) (Al) (Al) (Al	s ber	Pot-	tas- sium (K)					
Discharge Silica mi- Iron (cfs) (SiO <sub>2</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) mm (Fe) (Al) (SiO <sub>3</sub> ) (Al) (Al) (SiO <sub>3</sub> ) (Al) (Al) (Al) (Al) (Al) (Al) (Al) (Al	in part	:	Sodium (Na)					
Discharge Silica mi- fron (cfs) (SiQ <sub>2</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) (Al) (Al) (Al) (Al) (Al) (Al) (Al) (Al	lyses,	Mag-	sium (Mg)					
Discharge Silica mi- fron (cfs) (SiQ <sub>2</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) (Al) (Al) (Al) (Al) (Al) (Al) (Al) (Al	al ana	- E	cium (Ca)					
Discharge Silica mi- fron (cfs) (SiQ <sub>2</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) mm (Fe) (Al) (SiQ <sub>3</sub> ) (Al) (Al) (Al) (Al) (Al) (Al) (Al) (Al	hemic	Man-	ga- nese (Mn)		1		_	
Date Discharge Silica mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (SiO <sub>2</sub> ) mincollection (cfs) (cf			(Fe)	0.82	ļ	1	.57	ŀ
Date of (cfs) (SiO <sub>2</sub> )  Nov. 14, 1962 59 9.8 Apr. 5 346 18 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8 Nov. 14, 1962 59 9.8		Alu-	(AI)					
Date Discharge of cefs)  Collection (cfs)  Nov. 14, 1962 59  Nov. 14, 1962 59  Apr. 5 724  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33  Apr. 9 33			Silica (SiO <sub>2</sub> )	8.6	1	1	81	1
Date of collection collection Nov. 14, 1962 Apr. 5 July 11			Discharge (cfs)					
				Nov. 14, 1962	Jan. 15, 1963	Apr. 5	Apr. 9	July 11

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

1 .		l											
4	age		11	33	32	32	32	39	52 48	6.0	71	62	53
	31	11	П	32 32	32	11	33	11	62 55	11	3 3	57 53	11
	30	1.1	33	32	32	11	32	4 4	8 4 5	11	5 63	62 57	53
1	58	11	33	32	32	11	32 32	4 5	58 56	74	72	62 59	52
	82	11	33	32	32	32	32	4 4 8 0	58	73	<b>4</b> 2	61 56	53 51
	27	11	33	32	32	32	32 32	8 4	56	73	4 2	59	56
	56	11	33	32	32	32	32	4 4	40	73	44	55	5.6 5.2
	25	11	33	32	32	32	32	47	50	63	13	61 56	56 53
Ì	24	11	333	32	32	32	32	40	8 4 7 8	60	73	6.1	53
	23	4 4	33	32	32	32	32	9 9	48	5.8	4 9	64	52
	22	9 9	33	32	32	32	32	99	8 4	96	13	63	53
ĝ	21	1, 4	333	32	32	3 3	35	7 9	50	5.4	75	500	55
Srap	20	0.4	33	32	32	32	32	<b>‡</b> 5	0 9	59	72	39	56
OH L	61	3.0	33.4	32	35	32 2	32	5\$	40	59	29	99	61 56
the state of	82	0.0	3.5	32	32	32	32	8 4	5.5	58	10	5.0	61 58
ted	12	3.00	333	32	32	32	32	4 4 60 60	200	58	69	3.6	5.8
c tua	91	11	333	32	32	32	32	4.5	51	9 9	6.4	57	58
-1-a	15	11	2 4	32	32	32	32	46	9:	3.50	3 3	40	55
copo	4	11	35	32	32	32	32	3.8	46	5.5	79	58	4.6
8	13	5.0	4 4	32	32	32	32	3 33	4 4 8	4 4	0 9	59	53
thyl	12	53	3 %	32	32	32	32	38	8 4	54	1,3	99	53
(Continuous ethyl alcohol-actuated thermograph)	=	533	4 4	32	3 3	32	32	3.8	* ;	55	2 4	61	58
non	01	22.2	3 %	32	32	32	32	38	4 8	56	23	51	60 56
ntfi	6	11	36.4	32	32	32	32	36	3.5	9 4	8 5	25	57
ဍိ	8	11	333	32	32	32	32	37	54	8 9	69	55	61
	7	11	11	88	32	32	32	33	40	8 9	23	225	58
	9	11	11	334	32	32	32	33.8	4 80	699	70	55	56
	2	11	11	#0 # #	32 32	32	32	4 6	5.4	0.0	8 2	12.53	58
	4	11	11	36	32	32	32	3.5	52	63	68	69	55
	60	11	Ħ	80.8	32	32	32	34	52	6.2	27	5 %	3.4
	2	11	11	4 6	32	32	32	34	0.0	9 7	78	27	56
	_	11	Ħ	333	32	32.2	32	4 6	2.4	4 8	20 E	24	8 4
-	-		Ť	11	- : :	11	11	- : :	::	11	1:	11	1:
	Month	October Maximum Minimum	S C	December Maximum Minimum	田 田	Maximum .	mum mum	April Maximum Minimum	cimum iimum	June Maximum Minimum	mnm		September Maximum . Minimum .

### QUALITY OF SURFACE WATERS, 1963

### STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

### 4-580. MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MICH.--Continued

Periodic determinations of suspended sediment, water year October 1962 to September 1963

		Water		Suspend	ded sediment
Date	Time (24 hr)	tem- per- ature (°F)	Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)
Oct. 9, 1962	1420		58	2	0.3
Nov. 5	1500	1 1	68	2	.4
Nov. 14,	1705	1	59	1	.2
Dec. 10,	1600	l i	67	3	.5
Mar. 13, 1963	0945	1 1	22	1	.1
Apr. 5	1500		724	4	7.8
Apr. 9	1505		346	1	.9
May 8	1330	l i	137	6	2.2
June 12	1000	1 1	360	5	4.9
July 8	1640		32	4	.3
Aug. 6	1700		16	2	.1
Sept. 12	1430	1	22	1	.1

Turbidity

200 20 4 20

STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

4-582. SCHWEITZER CREEK NEAR PALMER, MICH.

August 1961 to September 1863. Maximum, 66°F June 4-6; minimum, freezing point Dec. 9 to Mar. 31. Maximum, 72°F June 29, 30, July 7, 8, 1962; minimum, freezing point on many days during winter months. LOCATION.--Temperature recorder at gaging station 10 feet upstream from highway bridge, and 2.5 miles southwest of Palmer, Marquette County.

DRAINAGE REM.--23.6 square miles.

RECORDS ANALIABLE.--Water temperatures: Maximum, 66°F June 4-6; minimum, freezing point Dec. 9 to Mar. 31.

EXTREMES, 1962-63.--Water temperatures: Maximum, 72°F June 29, 30, July 7, 8, 1962; minimum, freezing point on many days during winter months REMARNS.--Compilet else cover during winter months.

Chemical analyses, in parts per million, water year October 1962 to September 1963

Ų	E J	O -H	_	2		_		
ĺ	lved	Per- sent satur ation						20
	oxygen	perts mil-					_	5.8
ľ		or	25	32	15	12	30	80
		Hd	7.6	1	7.6	7,1	7.2	8.9
	To-Specific tal conduct-	ance (micro- mhos at 25°C)	161	112	151	162	161	183
	ta -	ity as H <sup>+</sup> 1						
	Hardness as CaCO3	Non- car- bon-	7	1	!	m	2	7
10	Har as (	Cal- cium, mag- nesium	69	52	67	77	2/9	84
Cicurcas analyses, in pares per million, water year October 1902 to September 1900	Dissolved	Sultate Chloride trate phate (residue (2al- Non- ity (mittor) (F) (NO <sub>2</sub> ) (PO <sub>4</sub> ) at 180°C) cium, car- as mhos at mil-setur- mag- bon- H <sup>-1</sup> 25°C)   Hometon (140°C) (15°C)   Hometon (15°C)   Ho	120					
3	Phos	phate (PO <sub>4</sub>	L					
12	ž.	(NO <sub>3</sub> )	2.4	!	1.3	1	!	;
	Fluo-	ride (F)						
I year O	:	(C1)	3.0	1	3.0	3.0	1	2.0
LOII, wate	;	ium bon- bon- Sullate (Li) ate (SO <sub>4</sub> ) (HCO <sub>3</sub> )	14	1	12	7.8	1	0.9
	S.	G # G						
Tod.	Bi-	ate (HCO <sub>3</sub>	92	ŀ	83	6	96	102
741.05	Lith-	(Li)						
7 17	Pot	siun (K)		_				
duall ser	;	(Na)			_			
TOTAL	Mag-	sium (Mg)						
CIRC	-  -	cium (Ca)						
	Man-	ga- nese (Mn)	0.13	ŀ			75	- 1
		(Fe)	0.21 0.13	ŀ	1	.54	1.5	
		(SiO <sub>2</sub> )	22	8.8	2,1 15	17	i	8.4
		Discharge Silica fron ga- (cfs) (SiO <sub>2</sub> ) (Fe) nese (Mn)						
	Date	collection	Nov. 14, 1962	Apr. 4. 1963.	Apr. 8	Apr. 9	July 17	Sept. 25

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued 4-582, SCHWEITZER CREEK NEAR PALMER, MICH.--Continued

Temperature (°F) of water, water year October 1962 to September 1963

1	. 1												
Aver	age	1.1	36 36	33	32	32	32	4 4	55	5.2 5.8	57	53 51	; ;
	31	1.1	11	32	32	11	32	11	62 57	11	5.0	50	11
ĺ	30	11	34	32	32	11	32	50	24	194	62 58	50	- 1
	29	1,1	3 4	32	32	11	32	50	260	0.6	62	0 4	1
	28	41	34	32	32	32	32	53	57	50	62	44	1
	27	44	34	32 32	32	32	32	51	55	62 55	62	4 4 8 8	1
	26	42	35	32	32	32	32 32	49	54	62 56	58	48	ŀ
	25	6.4	35	32	32	32	32	47	50	40	60	50	1
	24	11	35	32	32	32	32	0 4	53	40	59	50	;
	23	11	35	32	32	32	32	1, 4	53	61	58	52	1
	22	11	35	32	32	32	32	4 5	51	64	61	52	1
İ	21	11	36	32	32	32	32	8 4	52	69	58	55	,
	20	11	36	32	32	32	32	8 1 4	52	62	61	52	;
	19	11	36	32	32	32	32	50	55	29	5.80	50	53
	82	11	36	32	32	32	32	51	56	59	960	50	53
	17	11	36	32	32	32	32	51	56	65	8 4	4 4	25
Day	16	11	36	32	32	32	32	8 4	56	65	57	50	27
	15	11	36	32	32	32	32	8 4	50	43	50	5 64	20
I	4	11	36	32	32	32	32	20	51	209	57	50	64
	13	11	36	32	32	32	32	41	53	99	61	50	20
Ì	13	46	36	32	32	32	32	39	53	51	55	51	51
	=	523	36	32	32	32	32	9 9	52	55	50	51	51
	22	52	37	32	32	32	32	38	50	55	50	53	53
ĺ	6	52	37	33	32	32	32	<b>‡ \$</b>	8 4	200	2.4	53	53
	8	51	37	33	32	32	32	17	52	60	51	58	53
	7	51	37	3.84	32	32	32	<b>‡</b> ;	56	63	53	58	53
	9	21	37	44	32	32	32	40	52	99	51	58	25
	5	202	11	4 4 4 4	32	32	32	3.30	53	989	12 64	59	64
	4	11	11	3,4	32	32	32	35	52	99	50 8 8	55	20
	3	1.1	11	34	32	32	32	39	55	65	50.4	60	50
	2	9 4	11	4 4	32	32	32	39	53	63	5 8	60	64
	-	64	11	34	32	32	32	34	51	65 59	51	58	64
		<u> </u>	<u> </u>	1 1	11		11	::	11	<u>:</u> :	::	11	:
Month	WOIII	October Maximum Minimum November	Maximum	Maximum Minimum	January Maximum Minimum	Maximum Minimum	Maximum Minimum	April Maximum Minimum	Ay Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum

### ST. LAWRENCE RIVER BASIN

### STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

### 4-582. SCHWEITZER CREEK NEAR PALMER, MICH. -- Continued

Periodic determinations of suspended sediment, water year October 1962 to September 1963

		Water		Suspended sediment			
Date	Time (24 hr) temper-ature (°F)		Discharge (cfs)	Mean concen- tration (ppm)	Lischarge (tors per day)		
Oct. 10, 1962	0830		10	3	0.1		
Nov. 5	1600		37	96	9.5		
Nov. 14	1125		11	2	.1		
Dec. 28	1000	1	7.5	2	T		
Jan. 15, 1963	1700		1.5	1	T		
Feb. 28	1030		1,7	5	T		
Mar. 12	1500		2.5	3	T		
Apr. 4	1145	i i		3	T T		
Apr. 8	1150		7.0	2	T		
Apr. 9	1235		2.1	6	T		
June 11	1730		4.7	3	T		
July 8	1430		13	4	.1		
July 17	1730		2.8	8	.1		
Aug. 8	1330		4.2	20	.2		
Sept. 12	1530	] ]	3.4	15	.1		

T Less than 0.05 ton.

STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

## 4-585. EAST BRANCH ESCANABA RIVER AT GWINN, MICH.

DOMING.-At geging station in county park at Gwinn, Marquette County, 1 mile upstream from mouth.

BARIA.-134 square miles.

BARIA.-124 square miles.

BARIA.-125 square miles.

BARIA.-126 square miles.

BARIA.-127 square miles.

BARIA.-128 square miles.

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	ved	ion ion	20		!	-!		37
	ssol' oxyge	on the property of the propert	0 12.4 95	Ţ	1	Ť	1	8.4
	ā	r Pa	1001	55	55	45	20	20
		ŭ° Ħ	0.6	1	1	Ī	0.	2.
	ific	s at C)	176 9.0 1	81	100	119	146 7	152 7
	Spec	mho:			_			
	To- tal	ity H <sup>+</sup> 1	0	_	_	7	10	6
1963	ness aCO,	Non- car- bon- ate						
emper	Hard as Ca	Cal- cium, mag- nesium	9	31	1	48	53	68
to Sept	issolved	solids residue : 180°C)	175					
362	A	ر ا ا	0		_			
er 1		S tr	2.0 0.1 1.0				_	-
Octor	Ē	• T.E.	0	!	1	1	4.0	0
r year		Holoride (GO) (F) (NO) at 180°C) (ium, car- as mhos at 150°C) at 100°C) (ium, car- as mhos at 150°C) (ium, car- as mhos at 150°C) (ium, car- as mhos at 150°C) (ium, car- as mhos at 150°C) (ium, car- as mhos at 150°C) (ium, car- as mhos at 150°C) (ium 150°C)	2.	'	'	•	4	4
, wate		Sulfate (SO <sub>4</sub> )	22				24	
1110	් ථී.	Ø # ₹	50 14	0	0	0	0	0
per mi	Bi-	bon- ate (HCO <sub>3</sub> )		1	1	i	52	72
arts	Po-	sium (K)	1,1					
Chemical analyses, in parts per million, water year October 1962 to September 1963	:	Sodium (Na)	14 1.1					
ana lys	Mag-	sium (Mg)	2.0					
nical	-180	cium (Ca)	21					
Che	Man-	0,05	1	}	1	.18	1	
		0.49 0.05	1	1	ŀ	.56	1	
	Alu-							
		29	0.9	6.9	9.3	34	7.4	
		Olscharge Slitten mi- Fron ga- (cfs) (SiO <sub>2</sub> ) num (Fe) nese (Al) (Mn)	64	505	318	196	170	22
		of collection	Nov. 13, 1962	Apr. 4, 1963.	Apr. 5	Apr. 8	Apr. 9	Sept. 25

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued 4-885. EAST BRANCH ESCANABA RIVER AT GWINN, MICH.--Continued

-1	ه ا											
Aver-	age	4 4 8 3	36	9 9	32	32 32	32	0.46	53	65	63	1 1
	£	39	11	32	32	11	33	11	63	11		54
	30	37	35	32	32	1.1	32	4 4 6 6	61	75	11	59
	29	37	35	32	32	1.1	32	2 4 2 4	57	73	11	63
	28	37	34	32	32	32	32	0 4	61 58	72	11	63 58
	27	37	34	32	32	32	32	7 4	61	7.7	11	63 59
	26	37	34	32	32	32	32	47	60	71	11	63
	25	4 6 0 8	34	32	32	32	32	4 4 6 0	50	69	11	58
	24	40	34	32	32	32	32	39.2	51	99	73	64
	23	44	34	32	32	32	32	00	51	58	73	69
	22	7 4 7 4	35	32	32	32	32	14	50	61	72	63
	21	1.0	35	32	32	32	32	44	503	5.50	72	60
	20	64	36	32	32	32	32	42	4.9	5.5	71	59
	19	00,4	34	32	32	32	32	44	55	59	6.4	11
	81	51	37	32	32	32	32	46	9.4	58	63	11
	17	53	37	32	3 2 2	32	32	1.2	55	58	67	11
Day	91	53.6	37	32	32	32	32	6.4	53	96	50.00	11
_	15	58	37	32	32	32	32	3.6	64	5.8	64	11
	41	203	37	32	32	32	32	37	51	53	62	11
	13	52	37	32	32	32	32	34	51	53	6.9	11
	12	52	37	32	32	32	32	3.5	50	55	68	11
	=	5.4	36	32	32	32	32	3.8	4 4 0 10	57	67	11
	2	53	37	32	32	32	32	3.6	4 8	52	99	11
	o	5.2	37	32	32	32	32	80.60	52	69	59	11
	80	52	37	32	32	32	32	38	53	70	67	11
	-	52	37	8.8	32	32	32	38	50	70	67	11
	9	50.1	38	333	32	32	32	337	51	72	63	11
	2	20	38	37	32	32	32	35	<b>6 4 6</b>	72	99	1.1
	4	0.50	38	38	3.2	32	32	4 4	51	71	65	
	6	0 4 4	39	38	32	32	32	32	51	70	63	11
	2	64	39	37	32	32	32	32	8 4	63	75	11
	-	6 4	39	35	32	32 32	32	333	45	909	76	11
		1	::		11	::	11	11	: :	::	11	::
;	Month	October Maximum Minimum	Maximum	Maximum Minimum	January Maximum Minimum	Maximum Minimum	Maximum Minimum	nmum nimum	Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum

### QUALITY OF SURFACE WATERS, 1963

### STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

### 4-585. EAST BRANCH ESCANABA RIVER AT GWINN, MICH. -- Continued

Suspended sediment, October 1962 to June 1963

- 1		OCTOBER	₹ .		NOVEMBER	₹		DECEMBER	
		Suspen	ded sediment		Suspen	ded sediment		Suspend	led sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	53	3	0.4	77	2	0.4	57	2	0.3
3	50 49	4 2	•5 •3	78 75	1 2	•2	58 58	2 2	•3 •3
4	77	2	•4	72	2	• 4	60	3	• 5
5	77	2	•4	71	1	•2	76	8	1.6
6	70	1	•2	82	2	•4	77	6	1 • 2
7	63	2	•3	89	11	2.6	65	2	• 4
8	60 59	2 2	•3	89 80	1	1.0	60 56	2 2	•3
10	55	2	•3	72	1	• 2	54	2	• 3
11	52	2	• 3	69	2	•4	52	7	1.0
12	52	1	•1	67	1	• 2	50	5	• 7
13	46 46	2	•2	64	2	•3 •2	49 48	3	• 4 • 4
15	45	i	•1	60	i	• 2	47	3	.4
16	45	1	-1	69	4	• 7	47	3	• 4
17	43	1	•1	80	9	1.9	47	3	.4
18	40	1	•1	74	4	•8	47	3	• 4
19	39 38	1	•1	70 67	2 2	• 4	46 45	2 2	• 2
21	38 38	1	•1	67 66	2 2	•4 •4	44	2	•2
23	40	1	.1	60	2	• 3	42	1	• 1
24	42	2	•2	57	2	• 3	40	1	•1
25	42	2	•2	56	2	• 3	39	1	• 1
26	41	1	-1	55	2	•3	38	1	- 1
27	41 43	2	•2 •1	55 54	2 2	•3 •3	37 36	1 2	•1
29	44	2	.2	54	2	•3	35	2	• 2
30	46	2	•2	55	2	•3	35 34	1 2	• 1
31	60	3	•5					+	•1
Total	1534		6.7	2046		14•7	1520		11.4
		JANUARY	Υ		FEBRUARY	Υ		MARCH	
1	33	3	0.3	26	2	0 • 1	26	6	0 • 4
3	33 32	3 2	•3 •2	26 26	2 2	•1	26 26	6 6	• 4
4	32	2	•2	26	2	• 1	26	6	• 4
5	31	2	•2	26	2	•1	25	6	• 4
6	31	2	• 2	27	2	•1	25	6	• 4
7	30 30	1 1	•1	27 27	2 2	•1	25 25	6 6	• 4
8	30	1	•1	27	2	•1	24	6	• 4
10	29	1	•1	27	2	•1	24	6	• 4
11	29	1	•1	27	3	• 2	24	7	•4
12	29	2	• 2	26	5	•4	24	7	• 4
13	28 28	2 2	•2	26 27	6	•4	24 24	6	•4
15	28	2	• 2	27	5	•4	24	6	•4
16	27	2	•1	27	5	•4	24	6	• 4
17	27	2	•1	27	5	• 4	24	6	• 4
18	27 27	2 2	•1 •1	27 27	6	• 4 • 4	24 25	6 6	• 4 • 4
20	27	2	•1	27	6	.4	25	6	•4
21	27	2	•1	27	6	•4	25	5	•3
22	27	2	•1	27	6	.4	26 27	1 5 1	• 4
23	27 27	2 2	•1	27 27	6	• 4 • 4	27 28	5 5	• 4
25	27	2	•1	27	6	• 4	29	5	.4
26	26	2	•1	27	6	•4	31	5	• 4
27	26	2	•1	27	6	•4	34	5	• 4
28	26	2	•1	27	6	• 4	38 45	5	• 5
29	26 26	2 2	•1				60	5	•6 •8
31	26	2	•1				90	5	1.2

### ST. LAWRENCE RIVER BASIN

### STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

### 4-585, EAST BRANCH ESCANABA RIVER AT GWINN, MICH. -- Continued

Suspended sediment, October 1962 to June 1963 -- Continued

		APRIL			MAY			JUNE	
		Suspen	ded sediment		Suspen	ded sediment		Suspen	ded sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	196	7	3.7	138	3	1.1	60	3	0.5
2	362	13	13	126	2	•7	60	2	• 3
3	481	18	23	115	2	•6	61	2	• 3
4	479	18	23	105	1	•3	65	2	• 4
5	358	11	11	94	2	•5	60	1	• 2
6	279	7	5.3	87	2	•5	60	1	• 2
7	226	7	4.3	81	1	•2	63	1	• 2
8	194	6	3.1	109	2	•6	60	1	• 2
9	170	3	1 • 4	142	3	1.2	60	1	• 2
10	143	4	1.5	120	2	•6	84	2	•4
11	134	3	1.1	106	1	• 3	132	4	1 • 4
12	121	3	1.0	93	1	• 2	119	3	1.0
13	113	2	•6	91	1	• 2	117	3	• 9
14	105	2	•6	98	3	•8	152	8	3.3
15	100	2	•5	92	3	•7	146	9	3.5
16	96	4	1.0	8.5	2	•4	122	6	2.0
17	95	3	•8	79	3	•6	107	3	• 9
18	90	2	• 5	80	3	•6	94	3	• 8
19	124	4	1.3	76	3	•6	116	4	1 • 2
20	154	3	1.2	71	3	•6	219	11	6 • 5
21	136	3	1.1	73	2	.4	194	8	4.2
22	116	2	•6	76	2	•4	145	3	1.2
23	106	1	• 3	71	3	•6	115	2	• 6
24	97	1	•3	67	2	•4	95	3	• 8
25	89	1	•2	79	3	•6	82	2	• 4
26	85	1	•2	100	4	1.1	71	1	• 2
27	83	1	•2	84	3	•7	62	3	• 5
28	81	1	•2	74	3	•6	60	2	• 3
29	83	1	•2	69	2	•4	59	1	• 2
30	126	3	1.0	65	2	•4	60	2	• 3
31				60	2	• 3			
Total	5022		102•1	2806		17•2	2900		33.1

 Total discharge for period (cfs-days).
 18383

 Total load for period (tons).
 211,4

Periodic determinations of suspended sediment, water year October 1962 to September, 1963

		Water		Suspen	ied sediment
Date	Time (24 hr)	tem- per- ature (°F)	Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)
Aug. 14, 1962	1100 0900 1700		43 22 27	8 5 2	0.9 .2 .1

## STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

### 4-595. FORD RIVER NEAR HYDE, MICH,

LOCATION. --Remperature recorder at gaging station 40 feet downstream from county highway bridge, 1.4 miles downstream from Tenmile Creek, and 1.5 miles north of Myde, Delta County.

PRICORDS ARAL-450 square miles.

RECORDS AVAILABLE. --Water temperatures: Unly 1956 to September 1963.

RECORDS AVAILABLE. --Water temperatures: Maximum, 86°F July 1; minimum, Dec. 10 to Mar. 25, Apr. 3.

EXTREMENS: 1969-6-03.--Water temperatures: Maximum, 86°F July 1; minimum, Dec. 10 to Mar. 25, Apr. 3.

EXTREMENS: 1969-6-03.--Water temperatures: Maximum, 86°F July 19, Aug. 2, 1957, July 1, 1963; minimum, freezing point on many days

during winter months. REMARKS. --Complete ice cover during winter months.

1963	
1962 to September	( dr en
to	Š
1962	thom
water year October	(Continuous athyl alcohol-setuated thermograph)
year	Phol-
water	1 2700
	otho
wat	9
of	2110
(°F) of water,	Conti
Temperature	

Aver-	age	51	36 35	333	32	32 32	32	1 1 1 0	52	71	80	26 76	4 0
-	31	70	11	32	32	11	333		61	11	77	50	
	30	36	8.8	32	32	11	33	50	57	83	79	72	52
	59	386	333	35	32	Ħ	88	4.64	59	75.	183	73	55
	82	300	333	32	32	32	33	40,	59	90	80	07	60
	27	36.9	333	32	32	32	88	52	58	78 87	19 8	717	59
	26	38	33	32	32	32	33	8 1	56	7.8	83	73	57
	25	3.8	88	32	32	32	32	97	53	40	78	73	57
	24	4 4 4 0	33	32	32	32	32	4 1 2	50	73	81	75	57
	23	3 6	333	32	3.2	32	32	47	47	17	92	77	57
	22	4 4	33	32	32	32	32	5.7	52	69	81	78	58
7	23	0 4 4	4 4	32	32	32	35.5	456	52.5	62	77	11	58
20	20	46	33	32	32	32	32	9 6	56	65	82	92	62
Tall	61	264	3.8	32	3.2	32	32	7.3	53	65	92	72	68
ם כ	82	51	35	32	32	32	32	0.4	53	69	75	69	69
9	17	52	35.08	32	32	32	32	0.4	52	69	73	68	65
Day	91	50 EV	38	32	32	32	32	2 4	54	89	79	70	65
	15	5.58	3 3	32	32	32	32	2.6	128	959	76	72	62 56
4	4	52	36	32	32	32	32	39	51	59	76	72	55
ernyt	13	22	37	32	32	32	32	413	51	59	90	72	61
	2	9.0	37	32	32	32	32	9.6	50	57	82	202	99
3	=	55	35	32	32	32	32	46	209	28	79	73	69
CONTINUON	10	75	35	33	32	32	32	35	52	72	79	73	71
3	6	57	36	333	32	32	32	60	52	7.7	78	91	71
	œ	56	38	333	32	32	32	39	5.6	42	78	81	69
	-	50	39	33	32	32	32	39	57	40	78	83	68
	9	556	36	33	32	32	32	42	52	74	81	83	68
	c.	55.55	36	36	32	32	32 32	33	52	77	81	34	67
	4	55	36	38	32	32	35	33	56	44	76 <b>68</b>	81	65
	က	5.5	38	3.8 3.5	32	32	32	33	56	73	2 <b>6</b>	79	64
	2	5.5	39	33	32	32	32	333	52	69	74	77	71
		10.4	39	33	32	32	32	333	0.04	63	79	82	72
, de la companya de l	Month	October Maximum Minimum	Maximum	Minimum	January Maximum Minimum	Maximum	Maximum	April Maximum Minimum	Maximum	Maximum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued 4-655. STURGEON RIVER NEAR FOSTER CITY, MICH.

LOCATION. --Temperature recorder at gaging station, 30 feet downstream from bridge on County Highway 569, 1.8 miles downstream parton configurations fast and West Branches, and 4 miles south of Poster City, Dickinson County.

DRAINGE AREA. --237 square miles.

EXTRACS AND AND ALCHABLE. --Reter temperatures: Maximum, 86 F July 1; minimum, freezing point on many days during winter months.

EXTRACS. 1965-63. --Rater temperatures: Maximum, 86 F July 1; minimum, freezing point on many days during winter months.

FREMENS: 1965-63. --Rater temperatures: Maximum, 86 F July 1; 1963; minimum, freezing point on many days during winter months.

Temperature ('F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

Aver	9												
1 .	age	51	35	33	32	32	32	47	56	72	7.8 7.1	73	63
	31	39.1	11	32	32 32	11	32	11	67	11	7.7	67	1
	30	41 39	34	32	32	11	32	0.4 0.4	67 59	85 74	76	70	56
	29	37	33	32	32	11	32	4.8	64 60	81	74	72	4.0
	28	39	33	32	32	32	32	55	65	117	83	70 64	57
	27	37	32	32	32	32	32	55	59	78	83	65	9
	26	39	32	32	32	32 32	32	50	62 56	81 70	83	70 62	19
	22	41 37	32	32	32	32	32	4 4 6 4	51	76 67	81 75	6.8	9
	24	43	32	32	32	32	32	7 4 7 7	52	7.4 6.6	82	70	92
	23	43	32	32	32	32	32	44	53	17	82	7,07	55.
	22	8 <del>4</del> 8 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	34	32	32	32 32	32	45	51	69	81	75	80 %
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TOR	20	52	35	32	32	32	32	4 to	53	67	79	74 64	62
alconol-actuated thermograph	19	6.0	36	32	32	32	32	47	55 52	67	81	6.8	99
2	18	50.3	37	32	32	32	32	54	57	69	78	5.5	99
3	17	52	37	33	32	32	32	55	56 52	70	7.0	58	63
Day	91	5.50	38	33	32	32	32	51	54	68	75	61	4 5
101	15	95	38	33	32	32	32	52	50 48	64 60	73	0.4	62
7	14	53	35	33	32	32	32	50	51	58	75	69	95
	13	56	37	88	32	32	32	45	51	58	77	63	9
T (m) a	12	58	37 36	33	32	32	32	4 4 8 0	4 4	53	78	72 67	65
9	=	54	35	33	32	32 32	32	2 4	45	57	7.7	75	69
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3	6	54	37	33	32	32	32	4 6 6 9	57 53	72	75	78	7.7
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	-	55	38	33	32	32	32	4.4	55	74 70	76	74	68
	9	55	38	33	32	32	32	44	5.8 5.0	75	79	8174	67
	2	45	36	36	32	32	32	40	4 4 4 8	78	78	80	9 6
	4	54	37 36	38	32	32	32	9 %	4.0	78 69	57	78	63
	က	53	39	38	32	32	32	34	55	76	76 57	75	65
	2	40	3.0	33	32	32	32	37	53 48	72	11 81	75	67
L	_	2.04	39	33	32	32	32	33	54	0.49	44	78	69
		: ;	] ]				] ]	11	11	11	11	11	:
	Month	October Maximum Minimum	Maximum Minimum	Maximum Minimum	January Maximum Minimum	Maximum	Maximum Minimum	April Maximum Minimum	Maximum Minimum	Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-1215. MUSKEGON RIVER AT EVART, MICH.

LOCATION.--Temperature recorder at gaging station, 500 feet downstream from bridge on U.S. Highway 10 at Evart, Osceola County, and 0.4 mile upstream from Five Creek.

BANIAGA RES.--1, 450 square miles, approximately.

RECORDS AVILABLE.--Fater temperatures: Vocaber 186 to September 1863.

EXTREMES, 1962-63.--Water temperatures: Maximum, 82°F July 1; minimum, freezing point on many days during December to March.

EXTREMES, 1962-63.--Water temperatures: Maximum, 82°F July 1, 1963; minimum, freezing point on many days during winter months.

cerature (°F) of water, water year October 1962 to September 1963

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

	L							기	Continuous	naon		etuyı		OHO	-ac	arconor-actuated thermograph,	0	nem	TOEL	app		l			ĺ					-		
Month															Day															Ì	Aver-	
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January	- 1																													-		
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March		7		7		70											_	36		7		70	30	7	7		2			·	36	
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Min.mum		35		32	_	32	35	_		-							_	33		33		35	35	35	35					30	33	
April												_																_		-		
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July	. :		~	-	~	-			_		_			_	~			-		_;	_ ;			1				_		-		
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August	_		_	ò					6	_	_		ò 2	_				7		7	7	7	7	0	*	Ç	•			2	2	
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September Maximum	67	65	62	62		49												67		62			58		63						63	
				59	8	58	9	9	61	9 09	61 60	26	6 54	š	57	5	63	63	61	28	26	55	53	55	57	28	96	53	25	1	28	

## STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

4-1235. MANISTEE RIVER NEAR GRAYLING, MICH.

LOCATION. --Temperature recorder at gaging station, 25 feet upstream from bridge on State Highway 72, 2.5 miles downstream from Gooss Greek, and 6.5 miles northwest of Grayling, Grawford County.
DANIANG AREA. --189 square miles.
RECORDS AVAILABLE. --Water temperatures: Maximum 76°P July 1; minimum freezing point on many days during December to March.
EXTREMES, 1962-63. --Water temperatures: Maximum, 76°P July 1; minimum, freezing point on many days during winter months.

Aver-	age	0 9	38	33	333	32	35	51	98 64	67 58	70		4.4
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	7 28	7 0 4	3 36	2 32	2 33	2 32	35 36	5.5 8 4 9 4 8 4	63 62 55 56	72 67	73 71	62 62 56 57	
	27	39	36	32	32	32							
	92	0.60	358	32	32	32	39	475	52	72	<b>* 9</b>	5 5 4 5	-
	25	37	35	32	33	33	2 4	0.4	52	59	47	55	
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	23	9.0	36	32	33	32	3 %	4 4 6 4 8 6	43	55	71	62	
	22	44	40 36	32	32	33	37	0.4	52	27	71	8 0	:
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	8	51	38	36	32	32	333	4.60	56	61	72	52	
	61	51	35	36	32	32	33	6.4	58	20	71	64 55	:
	82	9.4 0.0	33	3.3	32	32	33	5.5	56	56	73	61	,
Day	17	4.0	41	35	33	32	36	80.0	9 4	55	67	60	
Day	91	9.4	41	32	33	33	36	52	50	58	89	55	
_	15	2,4	365	32	333	32	33	51	229	51	5 67	22	1
	4	51	9.0	32	33	32	36	646	50	5.6	65	94	
	2	4 80	39 %	32 3	32	32	37.6	87	57	51	6 4	5.4	
	27	24	38	32	32	32	32	8 2	55	57	71	58	-
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	2	w 0	39	32	35	32	35	45	8 4	58	69	69	
	9	53	42 4 4 6 9	32 3	37 3	323	38 3	44	53 5	68 6	57 5	70 6	
	œ									70 6		61	
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	9												_
	H	10.4 10.4	36	33	333	2 32	33 33	20 4 0 4	56 57	73 71	70 71	68 72 61 63	;
	rz.	7, 4	39	70	33	32		8,50					
	4	22	42	19	32	32 32	333	39.0	58	1 72	9 68	9 63	-
	e .	53	41	<b>‡</b> ;	32	32	32	50	59	71 61	69	59	
	2	53	4 4 4 1	3.61	32	32	32	54	6 4	5.68	67 6	62	- ;
L	_	529	4.0	3.60	32	32	32	44	204	. 57		6.6	,
1	Month	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum	eoruary Maximum Minimum	March Maximum Minimum	April Maximum Minimum	May Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September

STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

4-1245. EAST BRANCH PINE RIVER NEAR TUSTIN, MICH.

LOCATION.--Temperature recorder at gaging station, 75 feet downstream from highway bridge, 1.6 miles upstream from North Branch, 3.0 miles west of Twistin, Geocla Country, and 5.5 miles northwest of Le Roy.

DANIANGS ARSA.--63 square miles, approximately.

DANIANGE.--Rate remperatures: 1.01 1952 to September 1963 (discontinued).

EXTREMES, 1962-63.--Mare remperatures: Maximum, 68°F lune 5, 7-9, June 30 to July 2); minimum, freezing point Mar. 27-29.

EXTREMES, 1962-63.--Water temperatures: Maximum, 73°F July 4, 1955; minimum, freezing point on many days during winter months.

## STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

4-1250. PINE RIVER NEAR LE ROY, MICH.

LOCATION .-Temperature reorder at gaging station, 15 feet downstream from highway bridge, 5.0 miles northwest of Le Roy,
5.1 miles downstream from East Branch, and 5.3 miles southwest of Tustin, Osceola County.

BAILANGE RRA.-118 square miles.

RECORDS AFAILABLE.-Farter temperatures: annuary 1953 to September 1963 (discontinued).

EXTREMES, 1962-63.-Farter temperatures: Maximum, 67F June 7 8 minimum, freezing point on many days during December to March.

EXTREMES, 1963-63.-Farter temperatures: Maximum, 69F July 22, 1963, Aug. 1, 2, 5, 6, 1965; minimum, freezing point on many days during winter months.

REMARKS. -- Recorder stopped Jan: 20 to Feb. 8, estimated temperatures of 32°F included for this period.

Aver-	age		0.00	* *	m m	en 04	vo at	9.6	w 0	2.89	- 0	ao 40
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	31	33	11	33	32	11	37	11	53	11	966	56 54
	30	14	36	33	32	11	38	50	50	66 62	58	55
	29	14	36	33	32	1.1	33	50	56 52	65	2 9	55
	28	37	35	33	32	32	34	51	57	64	63	55
	27	<b>4</b> 4	35	33	32	32	34	47 45	57	64 61	63	5.5
	26	£ † 4 1.1	35	33	32	32	34	4.5 4.3	56	58	64	55
	25	4 4 0 6	36	33	32	32	35	43	53	62 57	63	54
	24	4 4 6 2	36	33	32	32	35	6 4 5	52	56	60	58
	23	14	37	33	32	32	38	2 4	4 4 6 4	55	59	59
	22	7,4	37	33	32	33	36	4 4 7 4	51	58	69	59
	21	8 t 7 t	37	33	32	33	3.5	0 8	53	55	63	5.5
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	81	0.80	38	35	32	4 4	36	51	54	61 56	69	56
	17	503	38	33	33	34	36	51	54	59	60	56
Day	91	532	39	33	33	32	36	2 4	404	59	80 17	55
	15	52	33	33	33	33	3,6	2 4 2	52	58	57	56
	14	53	39	33	- <b>6</b> 6	33	34	2 4 5	53	55	57	56
	13	22	9 9	33	33	33	36	4.7	53	52	59	57
	12	55	9 9	33	8 8	33	36	43	50	57	59	58
	=	55	00	33	33	33	3.0	4 4	4 4 5	56	5.5	59
	21	52	0 0	33	<b>8</b> 8	33	35	1 0	4.8	9 7	5 4	60
	6	52	9 0	33	3.5	32	34	41	53	65	5.5	61 58
	80	52	0 0	34	3.5	32	34.5	6.4	404	65	60	60
	7	52	00	35	3.5	32	34	4 4 6 6	50	63	61	61
	9	52	0 0	3.5	35	32	33.5	4 4 0 0	50	66	61	59
	2	52	244	9 99	3.5	32	3,4	4 4	51	66	560	60
	4	50.	45	38	35	32	36	4 4 9	51	60	56	61
	က	0.80	24	3.88	4 4	32	3.5	4 4 0 8	51	59	5.9	60
	7	8 80	41	35	<b>4.</b> E	32	33	4 1	43	57	63	98
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Month	MOILU	e -	<b>G</b> -	December Maximum Minimum	January Maximum Minimum	Maximum Minimum	March Maximum Minimum	April Maximum Minimum	KIMUM	June Maxımum Mınimum	July Maximum Minimum	August Maxımum Minimum

## STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-1255. PINE RIVER NEAR HOXEYVILLE, MICH.

LOCATION. --Temperature recorder at gaging station, 500 feet upstream from bridge on State Highway 37, 4.2 miles northwest of Board Courty, 8.0 miles east of Wellston, and 8 miles upstream from mouth.

BALINIAGE REEM. --251 square miles.

EXCORDS ANAILABLE. -- water temperatures: July 1982 to September 1983 (discontinued) and the second miles.

EXTREMES, 1982-63. -- water temperatures: Maximum, 66 FP June 10, 30, July 2, 23, 27; minimum, freezing point Dec. 11-14.

EXTREMES, 1982-63. -- water temperatures: Maximum, 68 FP Aug. 1, 1995; minimum, freezing point on several days during January 1 Pebruary 1988, and December 1982.

July 1982 to September 1963 (discontinued). Askimum 66°F June 10. 30, July 2, 23, 27; minaum, freezing point Dec. 11-14. Baximum, 66°F June 10, 1455; minaum, freezing point on several days during January 1955,

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

1	,	41												
	Aver	age	64	14	W 60	35	3 4	38	7.4	51	50	98	5. 9. 9.	52
		31	£4 43	11	34	346	11	41	11	55	11	61	58	1
		30	43	38	3,46	44	11	33	0.4	£ 9	6.5	200	55	25
		29	43	38	44	3,4	11	36	5 5	52	61	40	53	53
1		28	43	38	4 4	3 4	33	36	57	53	63	5.5	3.0 5.0	54
		27	42	39	3,4	3.4	3,4	35	23	52	\$ 5	65	57 55	55
		26	<b>4 4 5 4 7</b>	39	34	3 4	346	36	4 4	50	58	61	52	55
1		25	4 4 4	39	4 4	4 4	3 4 4	33	11	51	61	40	57 55	53
		24	94	39	33	34	3 4	4 4	::	0.04	9 6	40	58 56	25
		23	4 4 6 4	39	333	3.4	34	37	3 4	4 4 6 5 6	5.4	6.0	58	52
١		22	8 <del>4</del> 8	39	33	34	34	37	6 4	50	58	409	96 56	53
		12	84	39	34	4 4	34	38	50	52	57	59	5.6	55
alconor-actual the mermographi		20	4 9 4 8	39	34	34	35	38	N 4	52	58	61	52	56
213		19	64 84	39	37 36	34	9.00	38	4 6 4 8	53	57	\$ 5	55	57
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1		17	52	1.1	35	4 4	34	3.9	0.4	53	55	54	54	55
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2		15	54	22	33	**	4 4	38	23	50	58	55	55	54
		14	25 25	77	33	4. 4.	34	38	34	51	55	52	56	53
Į,		13	54 52	1,1	32	34	34	38	9 4	51	55	50	55	54
Continuous etuar		12	54 54	14	32	3.5	34	35	A 4 0 6	0 4	5.5	360	58	26
חסת		11	52 51	1,14	34	37 35	34	36	44	49	57	5.50 5.50	60	56
17.		10	52 51	41	36	38	34	35	47	53	58	5.6	60	57
3		6	52 52	41	36	338	24	35	ů. ‡	53	200	5.00	58	60
		8	52	<b>45</b>	36	37	35	37	4 4 0 t	6.0	909	3 %	61	57
		7	52 51	42	37	37	3.5	36	4 4 0 10	0.4	62	61 58	61 58	56
		9	52 52	42	39	37	35	37	34	50	59	96	61	57
		5	52 51	43	39	37	35	37	4 4	5.0 8.4	58	88	58	5
		4	51	63	3.9	37	34	35	7.3	20	61	5.0	57	26
		3	64	4 3 4 3	38	38	34	36	4 4	50	3 %	28	57	\$6
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			October Maxin Minim	ÄÄ	M. M.	Jamary Maxim Minim	M Ma	March Maxi Mini	April Ma: Mir	May Mi	June May Min	July Ma Mi	Aug Ma	Sept Ma

## STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

4-1262. LITTLE MANISTEE RIVER NEAR FREESOIL, MICH.

LOCATION.--Temperature recorder at gaging station, 25 feet upstream from Sixmile Bridge, 5.8 miles north of Freesoil, Mason County, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.

7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.

BENDAIMAGE A.-200 square miles.

RECORDS AVAILABLE.--Fater temperatures: October 1956 to September 1953.

EXTREMES, 1962-63.—Fater temperatures: Maximum, 71F July 1; minimum, 34°F on many days during December to March.

EXTREMES, 1965-63.—Fater temperatures: Maximum, 72F June 17, 18, 1957; annimum, freezing point Dec. 10-16, 1957.

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

1.	•												
Aver	age	50 4.8	4 <del>1</del> 2 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4	36	35	34	9.9	52	51	200	999	57	2.5
	3.	7. 4 17. 17.	11	8 8 50	35	11	47	11	62 54	11	61	55	11
	30	4 5 6 7	4 4 0 0	35	3.55	11	4 4	£ 8	50	0.49	99	3 %	6.0
	59	44	3 3	34	35	11	41	5.6	57 53	63	67	562	\$ 2
	28	44	39	35	35	3 4	37	51	92	89	64	58	9.5
	27	44 42	39	35	35.5	35	37	56 49	3 4	63	63	56	5.8
	56	43 41	39	34	9 9 12 15	34	39	5. 4. 8.	52	89	63	55	53
	25	44 43	39	35	35	35	45	5 4 0 4	57 51	58	62	55	52
	24	44	39	34	3.5	3.5	4 4 6 0	457	56	96	68	58	52
	23	44	41	34 34	35	80 E	45 36	4 4 8 4	55	6.4	61	62	5 3
,	22	48	42	35	35	35	34	E 80	50	53	67	4 8	53
	21	64	7 17	35	35	8 %	36	5.5	56 53	53	67	63 57	5.5
1	20	51	77	34	34	35	36	56	9.6	57	63	61 55	54
Day	19	51	11	39	3.5	35	38	27	52	53	63	3 4	56
	81	51	42	39	3.5	35	36	10 U	58	5.7	999	54	61
	17	54	43	34	35	35	39	5.0	56	56	40	57	52
Day	92	57	4 4	4 4	3.4	35	39	4 4 6 8	8 8	57	62	57	54
	53	57	4 6	3 %	3.5	3.5	3.6	64.0	52	7 5	28	55	90
	4	400	43	34	34	35	40	51	56	53	59	61	404
	5	52	6 4	34	80 G	20.00	3 60	0.4	52	54	50.00	56	400
	27	54	643	2.2	3.4	36	35	6 4	5 2	2, 2	5.65	59	53
	=	53	4 4	34	37	35.5	35	74	54	56	4 9 5	58	55
	2	53	4 4	35	39	35	34	F 4 4 3	50	69	6.50	59	5.5
	6	53	4.0	37	9.60	3.6	3,4	42	56	65	563	99	99
	·	54	11	38	3.0	35	34	44	8 4	6.4	57	99	0 4
	7	\$ 2	11	333	37	34	36	0.4	54	0.4	61	61	8 4
	9	8.8	4 6	38	37	35	35	51	56	0.4	58	65	9 29
	2	\$ 2	31	7.7	3 50	50.00	8 4	4 4 L 0	20	2.6	4 4	50	53
	4	52	33	47	35	35	35	52	2.4	69	4 %	59	54.
	3	200	4 t	413	3.55	3.4	35	52	53	65	59	59	5.0
	2	0° 48	ů 4	39	335	3.5	3.4	53	4.8	60	70	63	6.9
		51	24	79	3.5	35	34	17	52	4 9	17	58	60
		11	11	11	::	::	11	11	::	1	11	::	:
	Month	October Maximum Minimum	Maximum Minimum	Maximum Minimum	8 8	Maximum Minimum	mnm	April Maximum Minimum	Maximum Minimum	June Maximum Minimum	mum	August Maximum Minimum	September Maximum Minimum

STREAMS TRIBUTARY TO LAKE MICHIGAN -- Continued

4-1270. BOARDMAN RIVER NEAR MAYFIELD, MICH,

June 1961 to September 1963. Assistant of the Assistant of September 1963. March. September 1979 July 2; Mahimum, freezing point on many days during winter months. Maximum, 7379 July 2, 1963; Mahimum, freezing point on many days during winter months. LOCATION.--Temperature recorder at gaging station, 25 feet downstream from Browns Bridge, 300 feet downstream from East Creek, 1.0 mile northeast of Mayfield, Grand Traverse County, and 9.6 miles southeast of Traverse City.

DANIANGS AREA.--23 square miles.

RECORDS AVAILABLE.--Water temperatures: June 1961 to September 1963.

RECORDS AVAILABLE.--Water temperatures: Maximum, 71% July 2; minimum, freezing point on many days during January to March.

EXTREMES, 1961-63.--Water temperatures: Maximum, 71% July 2; minimum, freezing point on many days during winter months.

('F) OI water, water year October theze to September 1965 Continuous ethyl alcounted thermograph) Day	21 22 23 24 25 26 27 28 29 30 31 age	52 52 50 47 46 44 43 43 42 52 52 50 47 46 44 44 43 43 42 75	39 38 38 38 38 37 37 40 38 38 37 37 38 37 37 40	36     36     36     35     35     35     34     37       36     36     36     35     35     35     34     34	33 32 32 32 32 32 32 34 33 32 32 32 32 32 32 34	33 32 32 32 33 32 32 32 32 33	37 37 38 38 39 39 36 37 36 36 37 37 38 38	53 52 52 52 47	57 60 58 56 58 54 55 57 55 53 54 52	68 71 68 68 66 66 67 67 67 63	67 67 69 67 66 67 64 65 66 66 63 64	62 61 61 61 60 63 60 59 57 59 58 61	56 56 55 55 58
F 1963	22 23 24 25 26 27 28 29 30	52 50 47 46 44 44 43 43 50 47 46 44 44 43 43 42	38 38 38 38 38 37 37 37 38 37 37 37	36 36 36 35 35 35 36 36 35 35 35	33 33 32 32 32 33 32 32 32 32	32 32 32 32 32 32	37 38 38 38 36 36 37 37	53 52 52 52 50 52 52 50	60 58 56 57 55 53	71 68 68 67 67 67	67 69 67 65 66 66	61 61 61 59 57 59	56 55 55
17 1963	22 23 24 25 26 27 28 29	52 50 47 46 44 43 50 47 46 44 44 43 43	38 38 38 38 38 37 37 38 37	36 36 36 35 35 36 36 36 35 35	33 33 32 32 33 32 32 32	32 32 32 32 32 32	37 38 38 36 36 37	53 52 52 50 52 52	60 58 57 55	71 68 67 67	67 69 65 <b>66</b>	61 61 59 57	56 55
1,903	22 23 24 25 26 27 28	52 50 47 46 44 44 50 47 46 44 49	38 38 38 38 38 38 37 37 38 37	36 36 36 35 35 36 36 36 35 35	33 33 32 33 32 32	32 32 32 32 32 32	37 38 36 36	53 52 50 52	57	71	65	59	40 to
1903	22 23 24 25 26 27	52 50 47 46 44 50 47 46 44 44	38 38 38 38 38 37 37 38	36 36 36 36 36 36 35	33 32 32 33 32 32	32 32 32 32	36	50					
1,1903	22 23 24 25 26	52 50 47 46 50 47 46 44	38 38 38 38 37 37	36 36 36 36 36 36	33 33 32	32			55	68	64	9 9	5.6
11 1903	22 23 24 25	52 50 47 50 47 46	38 38 38 37	36 36	93		75						
1. 1903	22 23 24	52 50 50 47	38	36		60 04		0.4	55	99	65	63	55
16T 4	22 23	52				60 60	37 37	4 4 9	52	63	67	62	52
!	22		39		33	33	36	0.00	52	4 6	9 6	9 7 9	53
		25		35	33	33	37 36	52	55 52	64 62	67	6 63	55
p)	21		39	36	93	34	36	52	5.5	62	6.9	69	54
rap		53	39	36	33	34	37 36	50	5 <del>2</del> 4	65	65	63	58
thermograph)	20	53	39	36	33	34	37	51	54	63	89	60	60
the	61	54	39	36	33	34	37	51	54 52	58	63	58	61
te d	81	5.5	39	35	334	33	36	51	54	65	4.6	61	53
tua	17	56	0 4	35	34	33	35	6 4 9	55	63	63	61	53
Day	91	56	40	35	3.5	34	35	4 4 5 7	56	65	62	61	53
( F) or water, water year october (Continuous ethyl alcohol-actuated Day	15	53	41	35	35	34	35	7 4	52	40	62	53	53
alc	41	55	41	35	35	34	36	8 4	52	59	63	69	52
hy1	13	5.5	42	36		34	35	4 6	52	65 59	6.5	64	57
s et	12	56	42	36	36	34	35	4 6 6 9	53	62	64	64	62
non	=	27	41	36	3.8	33	35	4 4 0 4	53	63	62	69	59
150	10	53	42	36	36	33	35	4.5	55	68	63	63	60
	6	54	42	37	36	33	35	3 t	53	67	67	68	62
cure	8	55	42	38	36	33	35	4 5	53	67	6.5	63	59
lemperature	7	53	42	38	35	32 32	35	46	52 51	68 67	69	65	60
ine	9	53	45	38	35	32	35	45	52	68	6.6	63	5.8
	2	53	45	39	35	32	34	42	54 52	68	68 65	63	60
	4	53	42	39	44	32	* *	45	53	67	6.9	63	99
	က	533	42	39	34	32 32	34 32	38	51	66 64	70 67	65	61
	7	53	45	38	34	32	32	38	49	61	73	6.5	909
	1	54	45	38	3,7	32	32	38	51	61 58	70	6.5	60
Month	MOULT	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum	March Maximum Minimum	April Maximum Minimum	Maximum Minimum	Maximum	Inly Maximum Minimum	August Maximum Minimum	September Maximum

### STREAMS TRIBUTARY TO LAKE HURON

4-1280. STURGEON RIVER NEAR WOLVERINE, MICH.

LOCATION. --Temperature recorder at gaging station, 1.8 miles north of Wolverine, Cheboygan County, 2.8 miles downstream from DRAING AREA. --ITO square miles, approximately.

DRAING AREA. --ITO square miles, approximately.

EXTREMES, 1902-63. --Water temperatures: October 1988 to September 1963.

EXTREMES, 1902-63. --Water temperatures: Maximum, 73°F Juny 1; minimum, freezing point on many days during January to March.

EXTREMES, 1902-63. --Water temperatures: Maximum, 73°F June 28, 1959, July 1, 1963; minimum, freezing point on many days during winter months.

REMARKS. -- Recorder stopped Dec. 9 to Jan. 14, range 34°F to 32°F.

1-										Day	9				Day				mer mographi,	d d											Aver
	_	2	3	4,		9	-	80	91 6	10 11	12	13	4.	15	16	17	81	19	20	21	22	23	24	25	26	27	28	29	30	31	age
	129	50 54	51 53		523	52 5	52 52 51 51		52 51	464	522	5.4	53	57	52	2.4	6 4 6 4	54	0 4 0 4	3 4	7 4 7 4	42	4 4 6 0	39	141	747	41.	104	704	45	64
	417	45 4	42 42		39 3	37 3	41 41 39 41		42 41 41 39	10	40	39	38	39	4 4	38	38	36	38	38	39	36	36	36	37	36	37	36	38 37	11	38
	3.60	4 4	42 41		40 4	3 to 0 to	34 34		11		11	11	11		11	11	11	11	11	11	11	11	11	11	11	11	11	1.1	11	11	11
		11	11		11		$\frac{11}{11}$		11		!_		11	32	32	32	32	32	32	32	32	32	32	3 3	32	32	32	32	32	32	11
::	32 3	32 3	32 32		32 3	32 3	32 32 32 32		32 32 32 32	32 32	2 32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	11	11	11	32
	323	32 3	32	32	32 3	32 3	32 32 32 32		32 32	32 32	2 32	33	32	33	32	33	334	34	34	36	35	33	36	36	38	38	37	37	3.5	38	34 33
	38	37 34	30.0	9.6	35 34	37 34	44 38 38		41 40 37 36	345	4.6 6.0	4.60	34,	46	4 4	517	4 1 4 1	4 4 8 6	4 4 0 4	43	39	44	4 W	4 6	6 17	50	4 3 2	52	7 t t t 2 4 4	11	4 4 8 0
	39 6	51 24	54 53 47 47		50 5	6.4	51 49		47 53	418	4 4 6 4 9	6 5 5	6 t t	4 4	\$ \$ \$	5.04	4 6	5.0	52	51	4 4 80 4	41	4 4	53	57	59	53	53	58	52	53 46
11	24 6	55 5	59 5	59 66	59 6	99	99 99		67 64 61 56	506	5 57	55	52	61	62 56	5.4	55	58	5.08	508	51	53	55	57	69	70	63	69	72	11	64 56
::	73	72 6	65 65 58 55		566	5 8 6	65 63 61 56		61 63 54 54	2 9 2	5.66	65	58	560	56.3	58	68	67	67	68	67	8 0 9	6.5	68	63	5. 4.	6.4	68	65	<b>79</b>	99
	5.8	59	58 5	59 5	57 6	67 6	66 65		66 63	3 63	5 55	5.5	5 2 3	5.5	58	55	53	54	56	57	58	63	58	5.0	53	5.5	59	58	58	53	56
	0 4	5.9	57 5	58 5	57 5	52 5	57 58		59 57	53	8 5 4 5 4	50	53	55	52	5.4	52	56	53	53	5 1 2	53	5.4	50	57	55	50	50	51	11	56 52

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1290. PIGEON RIVER NEAR VANDERBILT, MICH.

LOCATION .--Temperature recorder at gaging station at Pigeon River Fisheries Experiment Station, 11.1 miles east of Vanderbilt,

Otsego County.

DANIAGE REA. -63 square miles, approximately.

EXTREMES, 1960-63. - Mater temperatures: October 1960 to September 1963.

EXTREMES, 1960-63. - Mater temperatures: Maximum, 777 July 1; minimum, freezing point on many days during December to March.

EXTREMES, 1960-63. - Mater temperatures: Maximum, 817 July 1; minimum, freezing point on many days during winter months.

	Ļ	du .												
	Aver	age	0.04	39	35	33	32	33	47	53	52	69	59	9,00
		31	55	11	33	32 32	11	37	11	51	11	66	53	11
		30	39	36	33	32	11	36	0.4 0.6	0 4 0 0	45	120	58	50
		59	38 38	36	32 32	32	11	38	51	53	72	70	59	50 50
-		82	39	36	32	32	33	35	56 46	52	73	72	969	5.6
		27	4138	38	32 32	32	32	37	51	50	73	72 67	64 56	59
		56	41	36	32	32	33	38	8 7 4	59	72	73	55	53
		25	39	38	32 32	32	32	42 37	84 39	52	70 56	72	57	52
		24	40	34	32	33	33	3.0	4.4 7.0	5.5	55	72	59	52
		23	45	36	33	323	33	32	44	45	52	70	66 62	56 51
all a		22	0 4 4 4	37	34	32	33	38	50	44	51	67	69	53
grai		21	4 t ts	37	34	32	32	38	24	51	58 51	999	69	57
9		20	49	37	335	32	32	33	0,4	53	53	99	56	55
tþ		13	52	39	34	32	32	33	50	52	62 58	66	55	65 59
ted		81	53	36	333	32	32	32	2.4	52	55	69	54	59
alcohol-actuated thermograph		17	55	37	33	32	32	34	52	200	57	58	5.5	61
1-a	Day	91	5.0	38.60	33	32	33	36	7 4 7 0	5.5	56	57	55	53
COP		15	59	38	33	32	32	37	27	4 <del>4</del> 4	51	58	55	58 51
[B]		14	56	40	33	32	32	32	47	48	50	59	58	58 51
ethy1		13	505	38	33	32	32	34	46	50	56 84	66	61 56	58
		13	53	38	33	33	32	34	19	0.6	53	20	60	5,4
(Continuous		=	55	4138	33	334	32	33	3.62	4 4 0 0	56 49	569	209	61 56
nt1		2	53	38	33.4	35	32	34	38	52	62 56	56	70	60 56
ĕ		6	52	38	34	36	32	33	39	52	71	56	45	56
		ω	533	38	33	34	32	33	97	0,4	71	57	11	55
		7	53	38	35	33.	32	32	8 7 7	51	67	66	72	58
-		9	54	39	40	34	32	32	38	54	63	70	7.1	553
1		2	53	38	79	33	32	32	36	6 <del>4</del> 6 <del>4</del> 6	71 61	57	2 %	61 53
		4	55 51	41	41	32	32	32	38	53	89	69	67	5.5
		ო	52	77	39	32 32	32	32 32	47	54	89	609	67 61	59 57
		2	55	42	38	32	32	32	38	52	57	<b>4 4</b>	65	960
		_	204	40	3.60	33	32	32	38	4.4	55	77	61	57
			: :	11	11	11	11	11	::	11	11	11	::	11
	Month	Montn	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum Minimum	Maximum Minimum	April Maximum Minimum	Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE HURON -- Continued 4-1355. AU SABLE RIVER AT GRAYLING, MICH.

LOCATION. --Temperature recorder at gaging station, 65 feet upstream from bridge on U.S. Highway 27 at Grayling, Crawford County, and 0.8 mile upstream from East Branch.

BROONDA MARAL.--IIO square miles.

RECORDA AVAILABLE. -- Water temperatures: March 1953 to September 1963.

EXTREMES, 1962-63. -- Water temperatures: Maximum, 82°P July 1, 2; minimum, freezing point on many days during December to March.

EXTREMES, 1963-63. -- Water temperatures: Maximum, 82°P July 1, 2; minimum, freezing point on many days during winter months.

1														
	Aver-	age	52	3.8	44	32	32	34	5.0	57 51	71 65	44	8 4	58
Ī		31	66 66	11	32	32 32	11	39	11	58	11	73	40	11
		30	39	38	35	35	11	37	24	53	79	73	65	20
- 1		29	39	38	32	32	11	35	55	59	7.0	27.	65	5 6
Ì		28	39	38	35	32	32	3.5	5.0	59	77	77	99	9.0
		27	40	38	35	32	32	35	52	58	F #	79	69	61 59
		26	38	38	35	32	32	36	4 4 8 7	63	76	27	66	61
		25	41 38	38	32	32	32	35	47	5 4	75	12	99	5 4
		24	45	35	32	32	35	36	2,7	58	73	77	65	22
		23	47	37	35	32	32	33	20 \$	2 4	63	75	71	56
		22	49	38	32	32	32	33	51	6.8	28	27	11	28
rapl		21	51	38	32	32	32	933	52	52	63	52	65	5 20
gour		20	51	38	32	32	35	333	52	56	67 61	75	89	265
the		61	50	38	32	32	32	33	52	52	0.0 6.5	75	60	66
alcohol-actuated thermograph)		18	53	38	35	32	35	88	55	59	70 44	75	63	69
tua		17	53	41 38	32	11	32	33	55	60 55	63	17	9 9 9 9	63
-80	Day	91	60	41	32	- 11	32	33	50	90	69	7.7	59	298
op o		15	62 58	39	32	11	32	33	51	52 49	53	63	61 58	55
8 Jc		14	59	9.6	35	32	32	88	<b>3 4</b>	52	59	17	57	54
hy1		£1	58 53	40 39	33	32	32	33	7.3	50	59	7.7	63	55
s et		71	58 57	41	8.8	32	32	32	4 4 6 6	£ 8	3.8	74	69	59
non		=	5 4 2	<b>4</b> 4	93	32	32	32	4.4	52	69 56	72	71	62
(Continuous ethyl		2	56	140	9.9	32	32	32	4 6	58	4 9	6.5	72	61
હ		6	56 55	41 38	33	32	32	32	6 4	58	76	6.5	73	66
		8	58	38	933	32	32	32	0.4	5.5	717	70	73	409
		7	58 57	38	0 E	32	32	32	5.0 5.0 5.0	55	75 71	73	75	63
		9	58	39	35	32	32	32	4 4 8 %	54	77	73	75	50.00
-		2	588	41 39	47	32	32	32	41	50	77	71 66	70 67	58
ļ	•	4	58	41	41	32	32	32	52	2 2	75	29	2 9	58
		3	55 55	<b>4</b> 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1	44	32	32	32	400	50	44	76 68	200	9
١		2	56	141	39	32	32	32	51	6.4	72	82 76	69	60
		1	56 52	40 39	39	32	32 32	32 32	11	4 0 4	63	82	69	61
			:::	::	::	: :	11	: :	1 1	::	11	11	11	11
	14.	MOULI	October Maximum Minimum November	Maximum	December Maxımum Minimum	January Maximum Minimum	Maximum Minimum	Maximum Minimum	April Maximum Minimum	Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1365. AU SABLE RIVER AT MIO, MICH.

LOCATION, —-Tomporature recorder at gaging station, 180 feet upstream from bridge on State Highway 33 at Mio, Oscoda County, DRAINGE AREA.—I.100 square miles, approximately substream from mouth.

DRAINGE AREA.—I.100 square miles, approximately to september 1963.

EXTREMES, 1962-60.—Takeer temperatures: Maximum, 74°F July 183. minimum, 33°F on many days during December to March.

EXTREMES, 1962-60.—Takeer tomperatures: Maximum, 74°F July 183. minimum, 33°F on many days during valuer months. ATTREMES, 2962-60.—Takeer tomperatures: Maximum, 74°F July 58; minimum, freezing point on many days during winter months. REMARS.—100° regulated at all stages by powerplant 500 feet upstream.

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

	,													
	Aver	age	51	38	36	4 4	34	35	447	52	64	69	99	59
		31	39	11	9 4	34	11	38	11	57		70	69	11
		30	39	38	4 4	4 4	11	38	94	200	99	71	63	5.4
		29	39	37	4 4	4 4	11	38	51	57	69	72	61	5.5
		28	44	37	3.4	4 4	4 4	3.8	4 <del>4</del> 0 9	55	67	<b>4</b> 2	63	55
İ		27	4 0 4	37	35	3.4	3 4	34	t 4 10 10 10 10 10 10 10 10 10 10 10 10 10	53	65	73	62	58
		56	4 7	36	35	34	35	35	44	52	68	73	65	5.9
		25	4 4 6 4	37	3.5	3.4	3 4	35	8 4	5.1	65	71	62	59
Ì		24	t 4 7	37	35	4 4	3 4	35	44	53	63	70	63	55
		23	4 4 4 7	36	35	3.4	34	35	50	53	6.0	68	63	58 57
aph,		22	51	36	3.5	3 4	34	3.5	50	53	69	6.9	65	5.0
logr		21	52	37	35	34	34	36	51	53	62 59	69	62	5.8
thermograph		20	54	38	34	34	334	36	51	5.5	59	68	63	58
		19	55	38	33	34	33	35	50	55	63	6 4	69	61 58
alcohol-actuated		18	5.5	38	3.4	34	33.4	3.5	50	5.4	505	89	65	58
act		17	56	38	33	35	34	34	44	4.6	57	67	62	5.0
0	Day	16	58	39	3,4	35	35	34	14	55	58	69	62	58
ICO		15	58 55	38	35	35	34	33	8 4 8 4	53	58	99	63	59
		14	5.5	38	3.5	2.50	3.4	33	54	52	54	99	63	59
etnyl		13	5.5	39	35	3.5	3 4	33	5.4	55	59	99	99	57
		12	55	39	36	35	34	33.4	4 4 5	50	59	99	6.5	58
ř		Ξ	56.	39	36	34	34	34	44	53	63	6.5	6.6	65
Continuous		01	5.5	38	37	33.4	34	34	47	54	68	67	69	61
5		6	5. 5. 6. 4.	39	37	34	34	3 46	4 4	53	70	9 9	68	59
		8	53	39	38	334	34	3.54	4 4 6 5	54	71	67	68	5.8
		7	5.53	39	38	3.4	3 4	4 8	7.0	53	5.58	67	99	5.00
		9	53	00	9.60	33	3.4	88	7.7 7.7	50	68	69	69	61
		ı,	53	104	339	33.4	3 3	4 8	50	53	63	70	6.9	57
		4	52	107	38	33.4	34	33	4 6 5 6	51	<b>64</b>	70	68	58
		8	52	39	3.08	37	34	3.54	4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	50	69	-17	6.6	260
		2	51	98	38	35	34	33.4	39	50	5.8	73	69	61
		-	51	39	34	35	3.4	34	9.9	0.00	55	72	02	69
1			1	11	1	11	11	1 ;	::	- ; ;	11	- ::	11	: :
	17	Month	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum Minimum	March Maximum Minimum	April Maximum Minimum	xımamı mumtu	June Maxımum Minimum	July Maximum Minimum	-	September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1380. EAST BRANCH AU GRES RIVER AT MCIVOR, MICH.

LOCATION.--Temperature recorder at gaging station, 25 feet downstream from highway bridge at McIvor, Iosco County, 1.1 miles east of National City, and 9 miles southwest or Tawas City.

DRIANGE ARRA.--84 square miles, approximately.

RECORDS ANAILABLE.- after temperatures: Gooder 1801 to September 1803.

EXTREMES, 1962-63.--Mator temperatures: Maximum, 76°F 019 1. 2; minimum, freezing point on many days during December to March.

EXTREMES, 1963-63.--Mator temperatures: Maximum, 76°F Aug. 3; 1967, July 1, 2, 1963; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1962 to September 1963 (Continuous ethyl alcohol-actuated thermograph)

	Aver -	age	51	38	33	32	32 32	8.8	644	56 51	67	68	4 8 8	8.68 4.0
-		31	24	11	32	32	11	141	11	57	11	64	56	11
-		30	4.1	0. 4 0. 4	32	32	11	39	423	53	74	5.67	58	51
		29	10	33.2	32	32	1 1	36	54	53	02	249	58	51
i		28	11	9.6	32	32	32	35	56	55	0,4	02	59	57
		2.2	39	4.6	32 3	32 32	32	9.8	6.4	545	4.6	75	55	5,4
ı		26	39	0.0 0.4	32	32	32	88	0.4	52	73	633	53	5.4
1		25	40	9.9	32 3	32 32	32 3	233	8 7 7	51	72	63	55	52
		24	414	35	32	32	32	32	45	57	11	70	59	51
١		23	0 1	36 3	32	32 3	32 3	328	80 60	623	58 6	69	62	493
		22	8 9	33	32	32	32	32	51	0.04	4 %	8 4	69	52
nd i		21	0.4	39 37	32 3	32 3	32 3	35 3	6.04	500	53.6	65	899	53
the rmog raph		20	20	324	32	32	32	32	6.89	53	200	63	56	57
le L		19	52	35 3	32	32.2	32 3	32 32	1.64	80 4	61 6	70 6	55.3	603
		81	52	9.9	32	32	32	32	7. 40	5.0 4.0	5.66	0,0	95	58
nar		17	57 5	39 8	32 3	32 32	32 3	328	5.55 6.55	80 4	563	663	260	200
-act	Day	16	57	104	32	32	32	32	6.4	52	7 0 9	9 8	55	53
	П	15	560	4 4	32 3	32 3	32 3	32 3	4 5 4 5 4 5	54 5	563	969	55 5	506
alcohol-actuated		41	25	38	32	32	32	32	8 7 7	4 6	52	100	55	4 0 4
		13	5.6	39 3	32 3	32 3	32 3	32 3	4 4 7 4	52 25	0.4	8.9	5.00	5.5
ethyl		12	5.0	4 5 4 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	32	32	32	32	24	6.04	8 4	0,0	5.8	55
sno		=	55 5	43	32 3	32 3	32 3	32 3	4 4	0.0	563	55 6	58 6	57 5
		01	53	60	32	32	32	32	40	801-	62	4 0	98	56
Continuous		6	53 5	39 4	32 3	32 3	32 3	32 3	4.4 0.01	0.0	9 99	26.2	66 6	563
		80	5.5	45	32	32	32	32	9 7 7	54	0,49	9 6	899	61
		7	55.5	38.	32 8	32 3	32 3	323	4 t 1 T	50.00	69 4	8 4	65 6	54 5
		9	2.4		8 4	32	32	35	47	5.6	71 65	7.1	61	52
		2	4 60	42 40	9 8	32 3	32 3	32 3	38.7	0.0 0.0 0.0	70 7	69 7	59 6	53.5
ı		4												5.08
		3	52 53 51 52	43 43	36 37	32 32 32 32	32 32 32 32	32 32	4 6 4 8 4 5 4 8 4 5 4 8 4 5 4 8	56 56	64 63	71 69	68 69 60 62	56.5
		2												-
		_	52 51	44 45 43 43	35 36	32 32	32 32 32 32	32 32	41 48	49 53	66 69	76 76 68 70	65 65 59 61	60 55 56
-		<u> </u>		4 4		:::		F 6	- 44	**	:::	- 9	::	- 10 kn
	3	Month	October Maximum Minimum	e -	December Maximum Minimum	5.5	Maximum	mum	April Maximum Minimum	mnmır	June Maximum Minimum	เมกน	-	September Maximum Minimum

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1390. HOUGHTON CREEK NEAR LUPTON, MICH.

LOCATION. --Temperature recorder at gaging station, 0.5 mile upstream from mouth, 3 miles downstream from Wilkins Creek, and DRAINAGE AREA. --27 square miles, approximately.

DRAINAGE AREA. --27 square miles, approximately.

EXTREMES AREA. --27 square miles, approximately.

EXTREMES 1925-05. -- Mater temperatures: Maximum, 68°F uluy 1, 2; minimum, freezing point on many days during December to March. REMARES. -- 1920-05. -- Mater temperatures: Maximum, 68°F ulue 25, 1952; minimum, freezing point on many days during December to March. REMARES. -- Recorder not marking Oct. 22 to Nov. 7.

1	,													
	Aver-	age	11	11	34	33	33	38	47	e 4 6 6	5.5	61	54	55
		31		11	32	32	11	38	11	52	11	5.0	54	11
		30		38	32	32	11	42	9 0	56	64	92	52	52
	ĺ	29	11	39	33	32	11	41	52	52	63 58	61	56	51
		28	11	38	32	32	32	33	53	52	60	58	2,6	56
		27	11	36	32	32	32	36	50	50	63	65	56	57
		26	11	36	32	32	32	33	8 4	2. 4 2. 50	63 58	58	55	52
1		25	11	38	32	322	32	33	41	£ 4	62 56	57	55	50.
		24	11	38	33	32	32	36	4 1	53	60	61	5.8	ν, 4 Ο εδ
		23	1.1	39	34	32	32 32	41	46	51	58 53	20	59	5 4 5 9
		22		39	34	32	32	33	8 4 6	4 5	50	61	20	52
(qd		21	4 4 5 8	39	32 32	32	32	38	51	51	55 49	61 58	5.8 5.4	53 52
ogra		20	0.4 0.8 0.8	38	37	32	35	35	20	52	53	5 6	53	53
thermograph		19	0.4	38	38	32	36	35	8 4	54 50	5. 8.	62 58	56 52	52
t t		18	64	37	38	32	36	38	52	53	53	56	52	55
te te		17	52	41	38 35	32	35	39	52	50	52	80 fV	55 53	53
acto	Day	91	52	117	3.5	32	32	39	44	56	53	8 4	52	27
101		15	55	4 to	32	32	32	34	4.1	51	57 51	5.58	52	6.64
1cot		4	50	404	32	32	32	8 %	4 1	50	53	56	53	51
/1 a		13	5.2 4.8	41	32	32	34	39	43	4 4	53	61	20 T	4.9
ethyl alcohol-actuated		12	52	4 4	32	32	34	34	4 7	51	E 0	25	58 54	52
		=	50	43	33	32	3.4	33	40	52	56	3 4	58	8 %
(Continuous		10	50	4 4 2 3	9 4 9 4	36	33	34	343	9 4	5. 8. 4.	9.60	5.5	54
Cont	ĺ	6	52	404	35	38	32	33	19	53	57	538	59	55
٤		80	5.2	4 4 6 2	35	37	33	38	4 2	55	9 9	0, 10,	56	53
	İ	7	52	11	35	37	33	34	4 1 4 6	51	5,0	61	58	53.4
ĺ		9	53	11	0 t 0	36	35	9 9	4 t t t	52	57	61 56	99	51
		5	52	11	14 0	36	32	38	37	53	61	55	55	51
		4	52 51	11	3 6	36	32	38	41	53	54	20	61	5.4
		က	51	11	47	32	32	39	4 4	53	60	63	96	5.4
		2	50	11	39	32	32	37 32	4 4 8	51	9 4	65	5.9	54
L		1	50	11	39	32	32	32	4 4	38	60	61	5.0	53
	Month	MOIICH	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum	Maximum Minimum	April Maximum Minimum	Maximum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE HURON---Continued

4-1395. RIFLE RIVER AT "THE RANCH" NEAR LUPTON, MICH.

LOCATION.--Pemperature recorder at gaging station, 0.2 mile downstream from Houghton Creek, and 3 miles southwest of Lupton, Ogenaw County.

DRAIMEG AREA.--54 square miles, approximately.

BRECORDS AVAILEE.--Water temperatures: Maximum, 70°P July 1, 2; minimum, freezing point on many days during December to March.

EXTREMES, 1960-63.--Water temperatures: Maximum, 70°P July 1, 2; minimum, freezing point on many days during December to March.

EXTREMES, 1960-63.--Water temperatures: Maximum, 72°P June 25, 26, 1952, July 5, 6, 9, Aug. 1, 1955; minimum, freezing point on many days during whiter months.

1	,	4.												
	Aver	age	52 50	45 41	36 35	33	33	37	4 4 9 4	56	62 56	5.8	61 56	53
Ī		31	46	11	3,4	32 32	11	38	11	53	11	62 58	55	1.1
		30	4 4 7 5	37	34	32	11	37	51	52	99	56	57	4 8
		59	4 4 3 4	38	44	32	11	35	4 6	53	28	909	61	50
		28	44	36	34	32	32	33	56	5.5	63	99	52	52
		27	4 4	38	4 4	32	32	33	52	53	65	67	55	5.4
		56	4 4	38	3,4	32	32	33	4 4 0 10	51	58	8 0 9	8 £	77 77 80 60
		25	4 4 6 4	38	34	32	32	34	4 4 8	56	57	69	53	5.0
		24	4 4 7 10	38	35	32	32	36	47	48	5 2 2	59	57	4 8 2
		23	4 4 7	39	36	32	32	36	4 4 8 6	4 4	53	566	59	52
ā		22	50	41	35	32	32	33	5 7	51	200	4 6	58	51
(Continuous ethyl alcohol-actuated thermograph		21	50	14 4	34	32	32	38	6.8	52	50	59	563	52
rmo		20	53	0 0	38	32	34	34	473	51	53	909	55	5. 5.4
the		19	υ 4 6 8	39	38	32	33	36	50	55	55	409	3 %	50
ted		18	52	41	38	33	35	33	52	53	53	58	59	60 56
tua		11	70 PV	43	3.5	6 6	32	36	474	53	53	60	5 B	5.8
1-ac	Day	91	2.50	6 4	35	33	32	3.8	6.0	925	8 2	62 56	5 4 4 4	52
opo		12	70 TV 80 TV	43	334	33	32	33	52	50	512	57	5.4	50
alc		4	57	4 4	9.9	8 8	32	33	12.4	52	25 E	61	54	4 8
thy1		13	7 ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °	43	6.6	33	34	36	7 4 4	5.6	51	63	57	55
S G		12	8 4	4 4	33	33	34	33	9 4	7. 4 8. 8	50	57	200	5.0
nonu		=	52	4 4 0 4	33	35	34	33	4 4 5 2	4 2	59	565	55	55
nti		2	54	4 v 4	33	35	32 32	33	39	₹. 4 8. 4	62 56	6 4	563	0. 10 5. 70
မို		6	5.55	4 4		36	32	32	4 4	5.5	<b>\$</b> %	53	58	56
		∞	₩.₩ 6.4	;;	3.5 3.5	36	33	34	7 4 4	52	50	52	57	55
.		7	5.5	4 4 4	3.4	36	9.6	36	64	6.4	5 8 8	58	40	55
		9	3.0	43	9 40	9.0	33	33	4 4 8 5	6 4	400	20.00	58	2.2
		2	3,4	2 4	404	80 B	32	35	3.6	8 4	2 8	5.63	56	52
١		4	10 to	4 4 0 10	39	3.4	32	36	4 4 6 11	53	5. 5.7	6.42	500	5. 75 8. 75
		3	4.6	4 4	404	4.6	32	34	4 4	4.8	59	57.5	6. 5.8	56
		2	1, 4 4 80	45	3.0	4 6	32	32	7 4	2 4	57	63	58	5.5
-	_	_	£ 84	÷ ÷	3.60	# # 4 4	32	. 32	44	\$ 9	. 57	. 62	57.	
	44.004	Month	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum	March Maximum Minimum	April Maximum Minimum	Maximum	June Maximum Minimum	July Maximum Minimum	Minimum	September Maximum Minimum

STREAMS TRIBUTARY TO LAKE HURON -- Continued

4-1400. PRIOR CREEK NEAR SELKIRK, MICH.

	Aver-	age	50	38	333	32	32	11	7 <del>4</del> 4	4 8 4 8	<b>6</b> 1 56	<b>6</b> 5	57	52
		31	42	11	32	32	11	64	11	53	11	63	58	11
		30	39	33	32	32	11	3.9	9 8	555	6.4	4 8 6 4	59	63
		29	39	33	32	32	1.1	11	53	52	65	6.4	59	52
		28	39	33	32	32	32	11	2,4	57	6.2	6.5	58	52
		27	39	33	32	32	32	11	0.4	58	64	69	5.4	59
		56	3.8	33	32	32	32	1.1	8 7 7	57	59	63	52	53
,		25	4138	33	32	32	32	11	39	53	58	62	53	40.0
		24	64	33	32	32	32	11	39	424	63	999	6.2 5.7	6 4 4
		23	4 to 4	36	32	32	32	11	<b>‡</b> °	51	54	60	63	52
		22	46	37	32	32	32	11	4 4	50	50	65	59	53
thermograph		21	4 4 4 4	34	32	32	32	11	47	51	55	99	57	53
rmog		20	0.04	34	32	32	32	11	44	53	60	63	50	55
the		19	50	34	32	32	32	32	4 4 4 6	56	59	9 4	54	61 58
		18	50	34	32	32	32	32	53	55	54	67	55	57
tua		17	55	39	32	32	32	32	44	56	53	59	55	57
alcohol-actuated	Day	16	55	39	32	32	32	32	9 4	52	57	57	57	55
oho		12	5.5	39	32	32	32	32	45	51	57	59	53	53
a]		4	56	38	32	32	32	32	4 5 2	27	<b>3. 3.</b>	69	55	51
hy1		13	55	38	32	32	32	32	414	54	51.	61	57	52
(Continuous ethyl		12	5.5	9 6	32	32	32	32	4 4 6 7	52	50	5 8	56	52
non		=	5.55	4 4	32	32	32	32	41	52	51	563	56	52
ntir		2	53	39	32	32	32	32	39	4 t	61 55	5.0	58	5,0
့ပွဲ		6	53	38	32	32	32	32	4 4	55	62 51	53	49	57
		∞	5.5	9 0	32	32	35	32	4 4 9 6	51	59	61	59	58
		-	5.5	9.50	32	32	32	32	9 4	51	59	64	6.6 6.4	5.5
		ဖ	55	9 8	37	35	35	32	4 4 20 E	5 4 8 8	63	4 8	99	0 S
		ro	53	38	37	32	32	32	<b>‡</b> <del>‡</del>	52	53	57	58	55
		4	522	47	36	32	32	32	8 4	52	62 58	56	62	55
		8	0.4	£ 5 2	35	32	32	32	4 4 6 4	52	61 58	59 65	99	55
		2	0.4	45	35	32	32	32	4 4	4 5	55	9,9	63	55
		_	0.4	4 0 4	34	32	32	32	4.2	37	5 4 5	70	49	5.0
	4	Month	October Maximum Minimum	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum	Maximum Minimum	April Maximum Minimum	Maximum	June Maximum Minimum	July Maximum Minimum	Maximum	September Maximum Minimum

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1405. RIFLE RIVER AT SELKIRK, MICH.

LOCATION. -- Temperature recorder at gaging station at highway bridge at Selkirk, Ogemaw County, 1.5 miles downstream from Prior

DRAINGE AREA.--110 square miles.

EXTREMES, 1962-63.--Water temperatures: October 1960 to September 1963.

EXTREMES, 1962-63.--Water temperatures: Maximum, 73°F July 1, 2; minimum, freezing point on many days during December to March.

EXTREMES, 1960-63.--Water temperatures: Maximum, 78°F Aug. 1, 1955; minimum, freezing point on many days during winter months.

EXTREMES, 1960-63.--Water temperatures: Maximum, 78°F Aug. 11-14; range 44°F to 49°F, 40°F to 52°F, 54°F to 64°F, respectively.

	Aver-	age	51 49	3.9	33.4	32	32	3.5	11	4 6 4 6 4 6	57	67	58	56 52
-		31	4 4 7 7 7 7	11	32	33	1 1	37	11	54	11	65	92	11
		30	42	35	32	32	11	345	300	58	70	67	61	52
		29	4.2	35	32	32	11	3,6	4 6 7	53	99	69	61	0.64
		82	45	34	32	32	32	35	424	53	65	6.5	61	20
		27	42	34	32	60.03	32	33	0.2	52	6,9	71	55	5.8
		56	4 1	3.5	32	33	32	3.5	# # 80 E	60	69	71	61	53
.		25	45	35	32	32	33	36	44	200	59	6.9	9,60	55
		24	46	36	32	32	32	36	10	56	57	69	59	51
		23	1.9	36	32	32	32	35	11	6.6	5.5	99	65	2 20
2		22	4 4 7	38	32	32	32	36	1 1	50	61	69	99	54
rapi		12	50	38	33	32	32	37	11	52	58	67	58	53
thermograph)		20	500	37	333	32	32	33	11	54	55	63	62 56	55
thei		19	50	37	33	32	32	33	11	56	61	63	55	61
		22	51	39	33	32	32	36	11	56	55	89	53	57
ethyl alcohol-actuated			56	39	32	32	32	36	53	53	61	63	59	53
-ac	Day	91	5.08	0 4	32	32	33	35		5.0	57	58	55	56
oho		15	5.6	39	32	32	33	333	11	51	60	63	55	55
a 1c		4	56	39	32	32	32	34	800	54	54	49	11	53
hy1		13	56	39	32	32	32	32	44	400	56	67	11	5.0
		21	56	41	32	32	33	32	24	53	56	6.9	11	58
non		=	56	77	32	33	32	32	4 4	50	61	57	11	5.5
(Continuous		2	5.0	10,	32	333	32	32	37	57	58	64	58	56
į		6	3,4	39	34	33	33	32	40	57	66 62	53	65	57
		œ	56	0 0 4	3 4	32	32	32	4 4	54	61	57	60	94
		7	56	38	35	32	32	32	<b>4 4</b> 20 20 21	5 4	69	65	99	5. 4.
1		9	56	3.8	35	32	32	32	4.7	60	99	59	67	51
		D	55	45	38	32	32	32	37	54 47	68	58	69	57 52
		4	5.54	45	38	32	32	32	47	53	59	65	68	55
İ		3	53	45	38	32	33	32	4 4	6 8 8	69	67	99	55
		2	52	45	36	332	32	32	74	50	58	73	63	5.9
		-	53	45	35	32	32	32	39	47	64 56	73	59	54
			1 1	; ;	::		; ;	1 1	11	11	1 1	11	: :	11
	1711	Month	October Maximum Minimum	Maximum Minimum	December Maximum Minimum	January Maximum Minimum	Maximum	Marca Maximum Minimum	April Maximum Minimum	Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

## \* STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1440. SHIAWASSEE RIVER AT BYRON, MICH.

LOCATION.—Temperature recorder at gaging station on highway bridge at Byron, Shiawassee County, 0.2 mile downstream from milidam which is just upstramm from South Branch Shiawassee River.
DRAINGA REEL.—368 square miles.
RECORDS AVRILABLE.—Where temperatures: Markin 1962 to September 1963.
STREELS, 1962-63.—Where temperatures: Markinum, 77°F June 6, 7, 30, July 3, Aug. 7; minimum, freezing point on many days during STREELS, 1962-63.—Where temperatures: Markinum, 77°F June 6, 7, 30, July 3, Aug. 7; minimum, freezing point on many days during March 1962 to September 1963. Maximum, 77°F June 6, 7, 30, July 3, Aug. 7; minimum, freezing point on many days during

EXTREMES, March 1962 to September 1963.—Water temperatures: Maximum, 79°F May 18, 1962; minimum, freezing point on many days during winter months. REMARKS.—Record missing July 1, 2, 8-31, Aug. 19-22 when thermograph was not working. December to March.

	Aver-	age	56 56	104	33	32	32	35	6 4 9 9	62 58	71 67	11	70 66	49
-		31	94	11	32	32	11	52	11	62	11	11	69	11
		30	94	35	32	32	1.1	52	56	49	77	11	64	53
ı		59	46	356	32	32	11	24	56	469	76	11	63	560
ŀ		82	43	36	32	32	32	L 4 4	04	49	75	11	99	62
		27	43	35	32	32	32	4 4 N W	52.7	61	22	TI	66	59
		97	45	35	32	32	32	4 4 5	464	59	44	11	65	62 58
		25	84	37	32	32	32	3 8 4	51	561	75	11	58	2,0
		24	4.8	37	32	32	32	338	L 2 2	54	71	11	65	55
ŀ		23	52	39	32	32	32	33	51	57	69	11	65	560
		22	57	96	32	32	32	32	54	8 4	67	11	11	59
ap		21	58	39	32	32	32	32	22	61	929	11	11	66
S S		20	90	39	32	32	32	32	54	59	69	11	11	65
thermograph)		19	58	38	32	32	32	32	54	63	69	11	11	65
9		18	59	10	32	32	32	32	53	61	64	11	9 4	67
tuat		17	65	417	333	32	32	32	51.	4 1 9	63	11	629	60
-ac	Day	16	65	6 6	33	32	32	32	52	58	65	11	69	58
pp01	_	15	949	43	333	32	32	32	4.6	286	59	11	6.5	52
alcohol-actuated		14	64	45	33	32	32	32	6.3	58	60	11	64	55
eth)1		13	65	424	88	32	32	32	51	58	61	11	69	560
		12	9 7	43	33	32	32	32	6 4 9	56	64	11	72	60
snot		=	61	6.6	33	32	32	32	\$ 4 8 rU	80 10	4 4 9	11	72	63
(Continuous		2	60	£ 4 £ 3	33	32	32	32	8 4	58	76	11	73	63
S S		6	63	643	88	32	32	32	44	299	22	11	72	63
		8	63	44	33	32	32	32	52	67	76	11	76	66
		7	63	43	88	32	32	32	6.0	59	22	73	7.4	63
		9	09 29	413	33	32	32	32	48	58	77	44	76	61
1		ro.	62 6	4 6 4	34	32	32	32	5.3	583	73	68	4.69	4.6
		4	65	4 4	38	32	32	32	20.02	61	75	73	75	99
		က	59	45	36 38	32	32	32	5.5	53	42	22	40	99
		2	58	2 4	35	32	32	32	2.2	9 8	72	11	73	64
		1	60	4.0	35.6	32	32	32	1.0	52	200	11	22	64
				; ;	1	::	;;	11	11	11		11	11	1 :
	Month	MOIIO	October Maximum Minimum November	Maximum	E E E	百日	mum	March Maximum Minimum	April Maximum Minimum	kimum ilmum				September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE ST. CLAIR

4-1609. CLINTON RIVER NEAR DRAYTON PLAINS, MICH.

LOCATION. --Temperature recorder at gaging station, 14 feet downstream from bridge on State Highway 59, 1 mile downstream from State 12 hatchery, and 2.0 miles south of Drayton Dialns. Oakland County.

DRAING AREA. --75.5 square miles.

EXENDIA MILHBEL—"Refer temperatures: October 1961 to September 1963.

EXTREMES. 1962-63. --Water temperatures: Maximum 877° 1011; intinum, freezing point on many days during January to March. REMEMES. 1962-63. --Water temperatures: Maximum 877° 1019; intinum, freezing point on many days during Vanier months. REMARNS. --Recorder stopped Nov. 1 to Jan. 4 and June 11.77.

1	Ł.	ا ۵												
	Aver	age	55 E	11	1 1	933	33	35	£ 4 8	57	1 1	79	73	55
		31	49	11	1.1	32	1 1	44 44	11	76 63	1.1	77	59	11
		30	48	11	1.1	32	1 1	47	56	71	71	79	70	61
		29	50	11	11	32	11	48 41	5.9	63	71	80	68	54
		82	52	11	1.1	32	34	4 0 4	53	69	81	0 6 9	71	52
		27	4 8 4 2	11	11	32	32 32	47 39	57	70	85	83	73	66 55
		26	46	11	11	32	32	4 1	200	70	83	82 67	73	67
,		25	47	11	11	32	33	4 4 0 4	5.5 8	66 57	82	83	71	64 54
1		24	649	11	11	32	32	4 % 4 %	52	56 4 6	6683	84	71	62 51
		23	52	11	11	32	32	35	4 4 8 4	53	79	82	74	51
<u>a</u>		22	53		LI.	3.2	32	32	6.9	59	49	77	76	63 54
rap		17	5.88	11	1.1	32	32 32	36	57	57	72	8 4 4	76 60	200
thermograph		20	57	11	1.1	32	34	9 8	400	57	69	75	73	5.9
the		61	62 52	11	1.1	32	35	34	5.5	63	76	81	9 8	59
		82	61	11	1.1	32	36	35	58	67	77	683	55	70
tua		1.1	60 40	11	1.1	32 32	33 32	35	22	67 61	11	80	6.8	69 56
alcohol-actuated	Day	16	66	11	11	32	32	33	54	67	11	63	72	5 8 4 4
oho		15	58 58	11	1.1	32	32	32	5.6 6.9	9 6 0 5 6 0	11	63	71 57	53
a1c		4	56	11	11	32	33	32	54	62		74	57	51
ethyl		13	64 54	11	11	32	33	32	4 4	61	11	78 66	68	62 51
		21	9 6	11	1.1	33	34	32	51	63	11	79	72	69 56
(Continuous		=	69	11	11	33	35	32	4 4 6 4	55	11	79	75	57
nti		으	56 56	11	11	37	34	35	1 4	57	83	75	77	69
3		6	61	11	1.1	35	32	35	2 4 4	61	79	73	75	29
		∞	5.9	11	11	35	32	32	8 t 4 7 t	70 58	63	76	78 64	58
		۲-	64	11	11	3.6	3.5	36	44	57	78	7 9 6 8	79	65 55
		9	4 6 4	11	11	3.5	33	32	12	65 56	48	6.8	7 8 6 4	5 4
		വ	5.9	11	11	36 35	34	33	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	5.5	70	7.9	77	55
		4	61	11	11	11	32	33	41	55	693	8.69	463	563
l		က	59	11	11	11	32	32	4 4	52	82	80	8 9	65
		2	56	11	11	11	32	35	\$ <del>\$</del>	51	67	98	6.4	9 8
		-	57.5	11	11	- 1 1	32	33	4 <del>4</del>	56	77	73	4 4 9	55
			: :	11	! !	: :		] ;	11		::		:::	
	1000	Montn	October Maximum Minimum November	Maximum Minimum	December Maximum Minimum	January Maximum Minimum	Maximum Minimum	Maximum Maximum Minimum	April Maximum Minimum	Maximum Minimum	Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE ERIE

OHIO 4-1935. MAUMEE RIVER AT WATERVILLE,

LOCATION. --At gaging station at bridge on State Highway 64 at Waterville, Lucas County, 3 miles downstream from Tontogany Creek. DRAINAGE AREA. --6,314 square miles.

RECONDS AVAILABLE, --Chemical analyses: March 1950 to February 1952,
Mater temperatures: March 1950 to September 1963.
Sediment records: April 1950 to September 1963.
Sediment records: April 1950 to September 1963.
SYTREMES, 1952-63.--Water temperatures: Maximum, 94F July 1; minimum, freezing point on many days during December to February.
Sediment concentrations: Maximum daily, 606 ppm Mar. 7; minimum daily, 1 ppm Jan. 9.
Sediment Concentrations: Maximum daily, 44,800 tons Mar. 8; minimum daily, 1 ton Jan. 5-9.
SYTREMES, 1950-63.--Water temperatures: Maximum, 94F July 1, 1963; minimum freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,240 ppm Mar. 26, 1964; minimum daily, 1 ppm on many days during winter months.

and 1963.

Sediment loads: Maximum daily, 208.000 tons Feb. 12, 1939; minimum daily, less than 0.5 ton on several days during October to December 1953, and September 1955. REMARKS. -- Low flow slightly regulated by powerplant above station. Flow affected by ice Dec. 19 to Mar. 7.

	29 30 31	64	4.2 4.7	13 34 32 42 32 32 32 32	35 35 34 34 32 32 32 34	36	49 51 52 52 46 47 51 51	56 57 52	8 69 69 72 74 6 6 67 66 68	90 87 91	85 85 87 83	74 78 80 75	_
	25 26 27		- 00	33 33 32	34 34 34	36 36 36 36 36 36	44 94 94 44 94 44	53 55 56 51 53 55	69 70 68 59 62 63	86 89 93 71 73 78	83 85 85 79 80 81	77 78 80 67 67 65	_
	23 1.4 2	54.51	4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	32 32 3	35 35 3	36 36 3	42 44 4	54 52 5	65 67 6	83 83 8 71 72 7	79 80 87	81 77 7 72 70 6	-
	-   -		4 4	34 33	34 33	37 37 37 35	40 40 40 40 40	55 54	66 64	80 83 70 71	79 79 77 78	83 85 68 71	_
	06 10		\$ 1 3 1	34 34	33 33	36 37	41 41 40 40	58 57	68 68	81 81 76 76	83 81	71 79	_
Ą.	17 14	7.	3 47	34 34	33 34	33 35	37 41	58 60	65 68	8 80 81	82 87	72 76	_
Day			-	33 33 33	34 34 32 33 32 32	36 35 35 35 33 32	38 37 37 37 37 37	54 57 55 51 51 53	67 66 70 61 60 63	75 76 78	73 84 82 69 70 71	4 79 79 8 66 68	_
	12   13	70 59 7	49 22 1.9	33 32 4	33 34 3	35 36 3 34 35 3	37 37 3 37 37 3	52 52 5	65 63 6 60 59 6	78 74 7 74 72 7	84 80 7 70 72 6	81 77 74 74 73 68	-
	11111	1 63	21.2	34 34 3	33 33 3	35 35 3	37 37 37 3	52 53 7	74 67 6	82 77 7	86 84 8 58 70 7	81 83 8 74 74 7	_
	c 	- 1 %	55 05 1 15 58 05 1 84	38 35	33 33	36 34 34 33	37 37	54 53	68 74 64 67	81 82 78 81	83 79 8 71 69 6	82 80 E	_
	٠ <u>-</u>		, 	43 40	32 32	36 36	37 37	54 54 52 53	65 66	83 81 78 79	91 85	78 80 77 76	_
	ص س	96	50   51   54 48   48	42 43	32 32	34 35 33 34	36 36 36 36	57 55	63 64 60 62	84 82 74 76	87 86 71 72	77 80	_
	e +-	54   54	50 50	48 47	32 32 32 32	36 36 35 34	36 36 35 35	56 57 53 55	57 61 53 56	78 79 72 74	92 84	81 79 76 75	_
	-1	- 0		49	32	3.0	36	1 53	53	76	94	77	_
	· 2		Ma muri	Maximum Minimum	January Maximum Minimum	Maximum Minimum	Maximum Minimum	April Maximum Minimum	ay Maximum Minimum	June Maximum Minimum	Maximum Minimum	Maximum Minimum	Diemora

### ST. LAWRENCE RIVER, By DIN

### STREAMS TRIBUTARY TO LAKE DRid--Continued

### 4-1935. MAUMEE RIVER AT WATERV" LEE, OHIO--Continued

Suspended sediment, water year Oc 5 & 1962 to September 1963

		OCTOBER			NOV - →			DECEMBER	
F		Suspende	ed sediment	<del></del>	Su	o ser) mant	-	Suspend	led sediment
Day	Mean			Mean			Mean	H	
Day	dis-	Mean concen-	Tons	dis-	M/ -	je	dis-	Mean concen-	Tons
i	charge (cfs)	tration	per	charge (cfs)	tration	7,31	charge	tration	per
	(618)	(ppm)	day	(CIS)	(pt ·	ı av	(cfs)	(ppm)	day
1	186	15	8	272			195	22	12
2	186	14	7	230	E	3 .	105	22	12
3	235	14	9	200	€	į i	190	. 22	11
4	248	14	9	215	~		186	20	10
5	225	14	8	220	d	5	210	20	11
6	210	14	8	215	1 7	4	340	19	17
7	205	14	8	220	7	4	584	18	28
8	256	14	10	248	7	5	184	17	8
9	445 342	15 15	18 14	248 346	-	5	170 200	17 16	9
		1		1				1	
11	520	15	21	233	6	4	300	15	12
12	397 280	15 15	16 11	190 276	b	5	250 210	14	9 7
13	240	15	10	364	ь 6	0	190	11	6
15	220	15	9	721	6	12	170	9	4
14	323	18	16	716	1	12	170	8	4
16	353	21	20	490	É	8	160	6	2
18	296	19	15	430	6	7	160	5	2
19	296 272	17	14	288	6	5 7	170	. 5	2 2 2
20		16	12	419	6		190	,	
21	256	16	11	438	6	7	210	4 '	2
22	230	16	10	688	7	13	210	4 1	2
23	554	16	24	240	. 10 F	6 85	200	4 1	2
24	320 306	15 14	13 12	706 264	14	10	200	4 .	2 2
20	328	13	12	210	13.	7	210	4	2
26	190	10	5	419	23	26	200	4 ,	2
28	186	7	4	312	26	2?	190	4	2
29	198	5	3	248	25	17	320	4	3
30	164 230	4	2	210	23	13	280 260	4	3
_				+					
Total	8697		342	10276	<u> </u>	317	6934		201
		JANUARY			FEBRUARY			MARCH	
1	240	4	2	230	-	3	500	4	5
2 • •	240 240	3 3	2 2	220 220	5	2 3	550 470	3	4
4	250	3	2	220	1 3	3	440	3	4
5	250	2	1	220	1 5	3	1000	12	32
6	240	2	1	240	5	3	3600	145	S 6150
7	,	2	î	250	-	3	21000	606	34400
8	~_0	2	1	260	, s	4	30200	549	44800
9	250 600	1 13	1 21	280 320	5 6	4	35200 32600	295 186	28000 16400
		1			1				
11	1400	38	144	400	5	5	27400	194	14400
12	500 250	11 9	15 6	450 500	5	6 7	24200 21000	172 122	11200 6920
14	230	1 9	6	550	5	<del>,</del>	18700	83	4190
15	240	8	5	550	5	7	19200	109	5650
,,	240	. 7.	4	500	5	7	18000	183	8890
16	250	1 7	5	480	5	6	17100	210	9700
18	270	7	5	460	5	6	16700	155	6990
19	320	6	5	550	5	7	16500	137	6100
20	330	6	5	1100	5	15	16600	126	5650
21	320	5	4	400	5	5	16400	163	7220
22	300	5	4	450	5	6	14600	225	8870
23 • •	290 280	5	4	1000 1100	5 5	14 15	11500 9260	146	4530 2700
	280	5	4	900	5	12	7380	91	1810
24 • • 25 • •		1 .	4	750	4	8 :	4960	86	1150
25	270		-		. 4	7	7000	94	1780
25	270 260	5	4	650					
26 27 28	260 240	5	3	550	4	6	7860	79	1680
25 26 27 28 29	260 240 220	5 5	3 3	550 			8180	69	1520
25 26 27 28 29	260 240 220 210	5 5 5 5	3 3 3	550  	4		8180 7150	69 65	1520 1250
26 27 28 29	260 240 220	5 5	3 3	550 			8180	69	1520

E Estimated. S Computed by subdividing day.

### QUALITY OF SURFACE WATERS, 1963

### STREAMS TRIBUTARY TO LAKE ERIE--Continued

### 4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Suspended sediment, water year October 1962 to September 1963 -- Continued

r		Suspend	ed sediment		Suspend	led sediment		Sugner	ed sedimer
_	Mean		ou souniitiit	Mean		ea searment	Mean		- sedimer
Day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	5330	55	792	1540	36	150	1180	28	89
2	6350	56	960	1510	34	139	822	29	64
3	7190	63	1220	1470	32	127	566	30	46
4	6880	76	1410	1290	28	98	524	30	42
5	5550	64	959	1140	26	80	510	27	37
6	5070	54	739	1180	24	76	631	27	46
7	4180	46	519	1220	21	69	1020	29	80
8	3460	43	402	1220	18	59	3240	38	332
9	2950	42	334	1010	15	41 35	5070	54	739
10	2430	40	262	1010	13	35	6120	72	1190
11	1890	38	194	733	11	22	9020	74	1800
12	1710	36	166	786	8	17	5590	57	860
13	1440	35	136 115	858	8	18 53	5180 3970	53 50	741 536
14	1250 1080	34	93	930 614	21 18	30	2640	47	335
					1			1	
17	968 1140	31 30	81 92	750 804	17 17	34 37	1970 1470	44	234 167
18	1140	30	92 98	1080	18	57 52	1140	37	114
19	3050		S 819	840	19	43	894	33	B(
20	10200	131	3610	987	20	53	699	29	5
21	11500	168	5220	987	20	53	496	25	33
22	9340	146	3680	949	20	51	440	21	25
23	7500	124	2510	786	21	44	454	16	20
24	5220	95	1340	733	22	44	440	13	15
25	4040	76	829	614	23	38	396	13	14
26	3600	68	661	648	24	42	374	13	13
27	2820	59	449	648	24	42	321	13	1.1
28	2030	50	274	750	25	51	267	14	10
29	2050	42	232	768	26	54	303	14	11
30	2030	39	214	631 1400	26 27	44 102	374	15	15
$\rightarrow$			28410	29886		1798	56121		7754
otal	123348		28410	29888		1796	96121		1124
		JULY			AUGUST			SEPTEMBER	
1	352	15	14	538	23	33	117	33	10
2	369	15	15	352	23	22	100	34	14
3	286 240	15 14	12 9	703 2140	27 46	51 266	150 144	34	13
5	225	14	8	2000	59	319	64	34	1
			. 1			201		1	
7	202 240	14	8 B	1330 1380	56 46	201 171	92 123	34 34	11
В	200	13	7	1020	35	96	141	34	13
9	159	13	6	840	28	64	135	35	13
10	165	14	6	648	26	45	117	35	1
11	172	15	7	510	26	36	117	36	1
12	153	15	6	385	27	28	194	36	19
13	153	15	6	490	27	36	87	37	Ģ
14	410	16	18	258	27	19	69	37	
15	278	16	12	218	27	16	78	38	6
16	272	19	14	249	27	18	111	37	1
17	716	22	42	258	27	19	159	36	15
18	699	25	47	188	26	13	147	35	14
19	1280 1440	28 32	97 124	202 267	25 25	14 18	147 150	35 34	14
									_
22	3030 4280	34 36	278 416	232 225	26 26	16 16	141 141	34	1
23	3600	35	340	232	26	16	117	33	10
24	3110	33	277	218	27	16	141	30	1
25	2030	31	170	172	27	12	172	27	12
26	1350	28	102	188	27	14	165	25	11
27	1080	26	76	188	28	14	157	23	16
28	858	24	56	188	29	15	152	20	- 7
29	631	23	39	188	30	15	60	16	;
30	396	22	24	188	31	16	123	16	
	418	23	26	165	32	14			
otal	28794	,	2270	16160		1649	3811		32

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued
Particle-size analyses of suspended sediment, water year October 1962 to September 1963
(Methods of analysis: B) bottom withdrawal thes; C, chemically dispersed; D, decaration, N, in native water;
(Methods of analysis: C, et analysis: W, in the distilled water)

Mathod	jo	1.000 2.000	SBWC	SBN	SBWC	SBWC	
	Percent finer than size indicated, in millimeters	. 002 0. 004 0. 008 0. 016 0. 031 0. 062 0. 125 0. 250 0. 500	_	_	_	_	
ıţ	in mil	25 0.2	_		9 1 1 8		
Suspended sediment	licated,	62 0.13	36	36 	66	<u> </u>	
ended	ize inc	1 0.0	96	- 6	9	66	
Susp	than s	0.03	_		92		
	t finer	0.016	L		84		
	Percen	0.008	78	25	8	96	-
		0.004	29	59	20	93	
		0.002	56	18	28	2	
Sodimont	discharge	(tons per day)					
Sediment	concen- tration	(mdd)	746	746	478	187	
	Discharge (cfs)		25400	25400	30500	16100	
Water tem-	ling per-	(F)					
Go mu	ling.	point		_			
	Time (24 hour)		1650	1650	1655	1845	
	Date of collection		Mar. 7, 1963	Mar. 7	Mar. 8	Mar. 21	

### 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.
REMONDS AVAILABLE.--Chemical analyses: June 1982 to September 1983.
REMARKS.--Determination of Suspended Solids, blochemical oxygen demand (BOD), and dissolved oxygen furnished by the city of Toledo, Division of Sewage Disposal.
No discharge records available.

	Bio- chemical	or demand (BOD)	50 4.5	4.8		1.5	3.0	ŀ	8.7	16.2	9.0	0.9	<b>4</b> , 10	0.0	4.0	4.0	2.0	;	15	6.0	10.5	6.0	1	ł
		-i <b>5</b>	20	4	30	36	34	27	32	40	15	 14	18				12				20	0 6	101	10
		Hd.	5.7	₹ •	7.9	7.0	7.3	7.5	4.	2.0	8.0	 7.3	4.0	5.5	7.2	6.9	7.4	7.1	9.6	*	6.7	9 0	4.	6.7
	To-Specific tal conduct-	ance (micro- mbos at 25°C)	614	684	677	720	747	791	721	1060	1090	461	603	200	561	572	574	601	570	000	624	0.00	552	537
	F 13	acid- ity as H <sup>+1</sup>																						
	Hardness as CaCO3	Non- car- bon-				101					136		144	•			130				113			
63		Cal- cium, mag- nesium	226	242	240	262	266	278	225	376	394	207	280	262	262	246	249	270	250	302	274	208	236	220
tember 19	Phos-Dissolved Suspended	solids at 110°C				33 4					0.4. 1.1.		32		16		62				46	04	! !	ł
2 to Ser	Dissolved	(residue at 180°C)	376	410	430	466					714	280	1 4	2 1	1	-	320	-	1 0	904	i	1 1	-	T
196	Phos-	us Po	0.46	.52	.50	75	8.	.89	6	ū.	4. 8.	.43	1 0	0 1	1	1	.51	1	1 8		1	1	1	-
ctober	- iz	rate NO <sub>3</sub> )	-	7.1	8.4	ດ ດ ດ. 4.	7.0	11	1.01	2.0	1.0 28 3.8	88	1	07	1	1	.4 16		1	<u> </u>	1	1	1	ī
ear C	-luo-	ride (F)	1		1	! !	ł	;	1	ļ	1.0	е.	1 4	. !	1	1	4.	1	1	}	1		1	1
Chemical analyses, in parts per million, water year October 1962 to September 1963		Chloride (Cl)	41	52	20	209	52	54	28	65	8 0	19	50	0.0	52	34	32	30	61	77	18	6 0	21	20
millior		Sulfate (SO <sub>4</sub> )	108	114	112	125	130	144	110	202	186	75	102	0 0	100	108	108	112	116	crr	100	8 6	96	96
per	ď.	G # 8							_															
parts	Bi-	bon- ate (HCO <sub>3</sub> )	161	181	180	200	197	200	192	7,67	322	118	166	178	162	144	146	174	154	434	196	46.	154	144
r,	Lifth-	ium (Li)																						_
alyses		sium (K)																_	_					_
ical an	;	(Na)	37	46	45	50	52	53	54	73	87.	8.4	1	<u>.</u>	1	1	21	1	1	97	1		ł	-
Среп		sium (Mg)																						
		clum (Ca)																						
	Man-	ga- nese (Mn)								_		 												
		(Fe)							_															
	Alu-	(A1)																						
		(SiO <sub>2</sub> ) mum																						
	Date	u o	Oct. 4, 1962.	0ct. 25	Nov. 1	Nov. 8	Nov. 29		Dec. 20	Feb. 6	Feb. 13	Mar. 27	Apr. 3	May 1	May 8	May 15	May 22	May 29	June 5	onue Tz	June 19	July 3	July 10	July 17

00000 0000		Turbid- ity	15 30 8 35 6	4 6 15 30 80	70 335 50 445 110 15
6 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		Turl	H 69 69	He w	F004464
4882 6.7.1 6022 7.1 5527 7.3 552 6.6 550 7.4 573 6.6 573 6.7 573 6.7 573 6.7	ics	Alkyl benzene sulfonate (ABS)	1:11	11117	%
1113 922 922 944 884 844 1000	Organics	Phenols as C. H. OH			
214 230 227 227 227 227 228 228 228	-				
[ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [	Dissolved oxygen	Percent satu- ration	37 71 84 75 126 136		
378	Dissolve	Parts per million	3.6 6.7 7.1 6.7 11.1	111111	111111
146911 11181		g		::::::	:::::::
6.7		ectic			
11111 11111		Date of collection	1963.	3. 110 217 31	14 28 28 1 11 18
28 20 119 20 22 24 22 24 26 26 27 28		Date c	May 22, 1963. May 29, June 5, June 12, June 19, June 26,	July 3. July 10. July 17. July 17. July 24. Aug. 7.	Aug. 14. Aug. 21. Aug. 28. Sept. 11. Sept. 11. Sept. 18.
96 86 96 96 97 90 91 100		Turbid- ity	15  40 25 20 15	40 30 15 10 10	110 40 15 25 30
124 185 196 165 161 174 174 178 164	ics	Alkyl benzene sulfonate (ABS)	1, 1, 1, 1, 2,	4.∞. ∟	2   1
	Organics	Phenols as C <sub>6</sub> H <sub>s</sub> OH			
31					
	oxygen	Percent satu- ration	36 70 47 78 63	77 89 76 85 88	93 106 81 78 76
	Dissolved oxygen	Parts per million	3.4 7.5 7.6 8.5 7.0	9.2 11.4 10.2 10.9 12.2	11.4 10.9 9.1 8.6 7.5
			1::::::	::::::	::::::
		tion	4, 1962 117 22 18 18	29	27 3 24 1 8 15
		511ec	8		
		jo Jo	196	1196	
963		Date of collection	Oct. 4, 1962 Oct. 17 Nov. 1. Nov. 8.	Nov. 29 Dec. 6. Dec. 20 Feb. 6, 1963 Feb. 13	Mar. 27 Apr. 3. Apr. 24 May 1. May 8. May 15.
July 24, 1963 July 31 Aug. 7 Aug. 14 Aug. 21 Aug. 28 Sept. 4 Sept. 11 Sept. 18 Sept. 18	ļ	-	000000	N A A A A A	M A P P M A A B M
11y 2 11y 3 11y 3 16, 7 16, 2 16, 2 19t.					
S S S S S S S S S S S S S S S S S S S					

### STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1940.22. MAUMEE RIVER AT TOLEDO OVERSEAS TERMINAL DOCK, AT TOLEDO, OHIO

LOCATION. --At Toledo Overseas Terminal dock in Toledo, Lucas County, about 1 mile upstream from the mouth.
RECORDS AVAILABLE. --Chemical analyses: October 1962 to September 1963.
REMARKS. --Determinations of suspended solids, biochemical oxygen demand (BOD), and dissolved oxygen were furnished by the city of Toledo, Division of Sewage al.
Disposal, No distabrage records available.

Bio-chemical oxygen demand (BOD) 7.2 7.2 9.0 6.0 6.0 6.0 4.8 0.00011 은 F 10048848 6 1 6 1 3 111215 1100 7.7 385 7.3 460 7.4 594 7.0 642 6.9 550 7.3 548 7.7 549 7.7 5608 7.8 652 7.6 7.7.000 8.00000 080044 4.0.00.0 핌 acid ance ity (micro-821 599 565 574 881 5561 598 516 516 556 578 592 565 577 606 587 Specific mbos at conduct-25°C) है दे ity H 76 76 76 88 83 86 86 23 81 76 78 78 78 85 106 132 139 139 03 10 88 88 88 88 Non-Hardness as CaCO<sub>3</sub> car-bon-Cal-clum, mag-200 200 272 292 293 264 264 260 248 248 244 244 248 287 276 244 200 200 218 194 194 184 220 220 216 300 204 1182 192 260 279 nesium September 1963 solids at 110°C Sus pended 41 138 79 85 118 26 21 57 23 19 19 56 59 47 47 8428 Phos\_Dissolved phor\_solids us (residue po, at 180°C) (residue at 180°C) 324 330 48 330 48 366 346 parts per million, water year October 1962 to 0.84 2.0 2.0 1.0 1.3 131 .57 59 <u>6 I</u> 1 ï 1 3.08.6 9 Ni-trate (NO.) 6.4 7.4 2.5 2.5 ŀ .2 ì 30 Fluo-21711 4. | | ride 111111 111111 111 11111 E Chloride 889 80 80 80 80 232448 <u>3</u> Sulfate ĝ 83 82 79 79 102 98 157 91 72 80 135 146 110 112 98 83 93 76 208 51 69 98 109 92 100 101 107 109 3 # # B 170 170 152 158 158 Bi-car-bon-ate HCO<sub>3</sub>) 218 1150 1148 222 244 244 266 104 104 104 108 108 108 224 200 200 187 137 132 E LE Chemical analyses, in Po-tas-stum (K) ļ Sodium 35 42 44 43 43 43 43 98 98 14 14 14 14 16 17 18 (Ka) Mag-ne-stum (Mg) Cal-ctum (Ca) Man-ga-nese (Mn) Fe) Alu-mi-(Al) (SiO<sub>2</sub>) Silica 22.....29.... 3. 10.... 27 6, 1963. 13.... 20..... 8.... 17..... 25..... 15.... 29.... 3..... : 15.... June 5.... 26.... ..... : : 1962 collection Date of 19 June 12. June July July July Nov. Nov. Nov. Nov. Apr. Apr. far. Sec. Dec. Feb. 

111111 1111	1		1			
100 110 110 100 100 100 100 100 100 100		Turbid- ity	115 110 115 84 84 84	9428421	25 40 140 55 190 110	120
C000000 00000						
4588 6.9 5.388 6.9 5.484 6.8 4.486 6.9 6.5 6.5 6.5 6.5 6.5 6.7 6.5 6.7 6.5 6.7 6.5 6.7 6.5 6.7 6.5 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7	Organics	Alkyl benzene sulfonate (ABS)	1511411	10,1110	111111111111111111111111111111111111111	}
	rga	_				
96 98833 772 90 90 90		Phenols as C,HgOH				
174 209 237 204 184 202 161 181 196 196	rgen	Percent satu- ration	38 36 77 131	111111	111111	:
111111 1111	red oxy					
1188111 1121	Dissolved oxygen	Parts per million	3.6 6.1 1.0 0.11			!
112/11 112		ton				i
118:111 117:1	1	lect				
111111 11111		Date of collection	1963	3. 110. 214. 7.	14. 21. 28. 14. 11.	55
20 22 22 22 23 24 24 24 27 27 27		Date	May 15, 1963, May 22, May 29, June 5, June 12, June 12, June 26,	July 3. July 10. July 17. July 17. July 24. July 31.	Aug. 14 Aug. 21 Aug. 28 Sept. 14 Sept. 18	Sept. 25
886 944 774 73 73 70 71		Turbid- ity	20 20 115 110 170	<b>8044</b> <b>80008</b> 9	10 140 25 35 7	35
95 142 188 188 137 166 125 138 164	ics	Alkyl benzene sulfonate (ABS)	न्यंययं वं		∞   <del>त</del>     ਜ	11
	Organics	phenols as CeHsOH				
9 9 9 9 9	oxygen	Percent satu- ration	26 56 68 68 142 34	51 76 76 92 59	78 101 97 104 78	80 74
	Dissolved oxygen	Parts per million	4 2 1 1 0 80 0	10.8 13.2 8.2 9.0	10.1 13.7 12.0 10.3 8.5	8.6
		u o				: :
		Date of collection	35t. 4, 1962 35t. 17 35t. 25 Nov. 1 Nov. 18 Nov. 18	6, 13, 220 22, 22, 1963,	20. 20. 3. 2. 1.7. 24.	May 1
		of	1967	1962		
		ate	4, 17, 17, 18, 15, 29	6, 27, 13, 13,	20 27 27 24 24	н ж
24, 1963 31		H	Oct. Oct. Nov. Nov. Nov.	Dec. Dec. Dec. Feb.	Feb. Mar. Apr. Apr. Apr.	May
24, 31, 7. 14. 28. 11, 11, 18,						
July 24, 1963 July 24, 1963 Aug. 17 Aug. 21 Aug. 28 Sept. 4 Sept. 11 Sept. 11 Sept. 12						

STREAMS TRIBUTARY TO LAKE ERIE -- Continued

4-1940.3. MAUMEE RIVER AT CENTER C. & O. RAILROAD DOCK, AT TOLEDO, OHIO

LCCATION.--At mouth at end of center dock of Chesapeake and Ohlo Hallroad coal-loading dock, at Toledo, Lucas County. REMORS. AVAILABLE.--Chemical analyses: June 1962 to September 1963. REMARKS. AVAILABLE.--Chemical analyses: June 1967 to September 1963. No discharge records available.

Col-chemical oxygen demand (BOD) 7.5 17.7 6.0 8.6 4.5 4.9 9.3 6.3 10.2 8.1 3.0 4.5 120 120 20 36 36 36 23.0 200 200 200 200 200 200 200 200 15 15 1511 121112 ö 7.53 4.00.27.7. 7.6 7.1 7.7 7.7 7.25 6.08 6.77 7.43 7.43 Ħ 850 1010 1160 262 368 525 483 503 478 501 564 588 722 563 563 445 795 572 639 572 572 568 528 556 561 589 638 655 acid- ance ity (micro-as mhos at H<sup>+1</sup> 25°C) mhos at 25°C) Specific (microconduct-를 <u>함</u> 68 58 58 66 66 car-bon-85 75 54 67 86 78 78 98 34 80 07 130 128 128 128 126 126 126 00 00 00 00 00 Hardness as CaCO, Nonate cium, magesium 206 246 1193 160 160 240 174 176 186 186 170 174 260 324 385 106 160 208 268 286 286 262 252 252 226 236 236 236 236 267 r-solids Suspended (residue at 110°C at 180°C) Chemical analyses, in parts per million, water year October 1962 to September 1963 40 146 146 158 158 78 83 136 84 51 112 30 42 93 118 92 51 33 24 62 35 36 50 96 102 188 phor-solids S us (residue a PO4 at 180°C) Phos-Dissolved 270 284 288 306 334 352 440 346 248 312 462 500 354 12 | | | 3 | . 87 . 78 . 46 . 92 1.2 .61 .92 .80 1.6 2.5 111 588 181110 Ni-trate (NO<sub>3</sub>) 60.00.000 112 16 9.8 6.5 10. 1119 i 11 25 Fluo-ride (F) 111111 1100111 211411 111111 181111 Chloride ĵ 446 444 444 72 72 88 98 98 11 11 225 23 23 28 28 28 28 34 33 34 37 37 38 37 Sulfate (30, 85 98 94 111 112 72 64 66 60 68 85 88 121 79 79 50 68 68 121 133 160 183 28 28 52 69 95 108 96 93 96 Ge par Bi-car-bon-ate HCO<sub>3</sub>) 130 142 156 136 138 148 175 175 130 138 188 24 168 192 166 54 72 Lith-ium (Li) Po-tas-sium (K) 0.6 14 21 1:1 Sodium 111 68 62 71 35 28 28 31 31 39 38 38 39 39 Mag-ne-sium (Mg) Cal-ctum (Ca) Man-ga-nese (Mn) (Fe) Ahu-mum (Al) Silica (SiO<sub>2</sub>) 13.... 20.... 3..... 13..... 20..... 3, 1963. .....62 13..... 25.... 8.... Nov. 15..... .....9 24..... 1..... 1..... : 4, 1962 collection ij Mar. Apr. Apr. Apr. May 1 Oct. Nov. Nov. Dec. Dec. Dec. Feb. Feb. Feb. Mar. May 1 May 2 May 2 June June June

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1.2 1.2 1.2 1.2 1.3 1.3 1.3	4.1.6.7	_ =	1		-						
0.99.09.07 0.88.08.74	6.5 6.5 6.5 6.5	Alkyl benzene	sulfonate (ABS)	1 1	0.3	1	11	2.	1		¦ 4;
626 534 463 4661 663 663 663	518 437 457 429 483 479 523	- T				_					
65 80 77 78 89 68 60	64 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	oxygen	ration	99	13 28	24	12		ł	57	22
242 203 8 196 7 117 7 7 117 8 117 8 117 6 6	192 6 163 4 168 6 151 3 172 6 168 6 177 5	Dissolved oxygen Parts Percen	million	5.0	4.0	2.0	0.1		1	5.3	2.5
4221111	333555	TO I		<del></del>		-					
6		Date of		3	July 10	24	31	Aug. 14	28	4.	Sept. 18
1   328	328	Dag		June	July	July	July Aug.	Aug.	Aug.	Sept.	Sept
1161111	14:	Turbid-	ıty	100			15				355
112	6.1		•								
		Alkyl benzene	sulfonate (ABS)	1 1	0.1	-	1	{ }	!	۲. ا	1   2
3 3 3 3 9 8 9	33 33 35 36 36 37 40		*	1	1 1	96	93	12	20	243	8 6 5 8 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5
94 88 88 78 79 90 90 90 90 90 90 90 90 90 90 90 90 90	74 65 62 70 70	Dissolved oxygen Parts Percent		10.9	12.0	10.1	8.6	7.2	6.4	4.6	5.4.2
216 151 150 121 105 132 132	159 140 126 140 136 130			::	::	:	::	:	: :	:	: : :
		Date of	Tree To	Mar. 6, 1963 Mar. 15	Mar. 27	3	Apr. 17		15	May 22	June 5
		a S	3	Mar.	Maı. Mar.	Apr.	Apr.	May	May	May	June
	32	Turbid-	ity	45			35 70	45 60	40	20	181
			ate .	4.01	ດ ຕ		m m	io s	~	n, u	
		A1ky1 benzene	sulfonate (ABS)	0.4.0	•	•		•	•		
		d oxygen Percent	satu- ration	67		49	49 68	E 8	92	80	70 99 90
		Dissolved oxygen	per million	7.6	7.5	5,6	8. 8. 8. 4.	3.8	13.5	11.3	98 21
June 26, 1963 July 3. July 10. July 17. July 24. July 31.	Aug. 14 Aug. 21 Aug. 28 Sept. 4 Sept. 11 Sept. 25	Date of		Oct. 4, 1962	Oct. 25	Nov. 8	Nov. 15	Dec. 6	Dec. 20	Dec. 27	Feb. 6

### 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.
RECORDS AVAILABLE. --Chemical analyses: June to September 1983.
RECORDS AVAILABLE. --Chemical analyses: June to September 1983.
Real Records Available.
No discharge records available.

	Bio- chemical	oxygen demand (BOD)	4.9													
Ì		Col-	ID.	'n	ທ	0	n			٥	0	0	ß	0	7	2
		Hď					7.1								6.9	
	Specific	ance (micro- mhos at 25°C)	344	365	374	341	381	348	332	312	326	329	379	350	448	358
	혈	acid- ity as H+1				_			_			_	_	_	_	
	Hardness as CaCO,	Non- car- bon-					52								37	
		Cal- cium, mag- nesium	129	141	142	134	146	134	130	128	133	133	148	128	164	141
	Dissolved	solids (residue at 180°C)	230	;	1	ŀ	230		206	Ì	i i	ŀ	1	1	310	1
[]	hos-	us Po	0.4 0.09	1	1	1	60.	1	.07	1	1	1	1	1	11.	1
er 196	ž	(NO <sub>3</sub> )	0.4	1	1	1	4.9	1	2.5	1	1	1	1	1	2.2	Ī
ptemb	<u>-</u>	ride (F)														
Chemical analyses, in parts per million, June to September 1963	:	Chloride (C1)	28	30	30	58	30	58	28	36	56	56	30	56	34	28
110n, Ju	;	Sulfate (SO <sub>4</sub> )	38	45	47	34	46	39	31	25	26	27	35	22	49	27
뒽		5 # B	_		~	_	_	_	•		_			~		
ts per		bon- ate (HCO <sub>3</sub> )	113	106	301	114	118	110	112	114	120	122	145	118	155	143
par	Ţ.		L					_						_		
1, 1,	Po	tas- sium (K)												_		
analyse		Sodium (Na)	17	ì	1	1	91	1	13	ł	1	!	!	!	27	;
emica	Мад-	sium (Mg)														
ទ	[8]	ctum (Ca)														
	Man-	ga- nese (Mn)														
		Fe)														
	Alu-	(A1)														
		Silica (SiO <sub>2</sub> )														
	Mean	discharge (cfs)														
	otec	of collection	June 26, 1963	July 3	July 10	July 17	July 24	July 31	Aug. 7	Aug. 14	Aug. 21	Aug. 28	Sept. 4	Sept. 11	Sept. 18	Sept. 25

	Dissolved oxygen	oxygen	Orga	Organics					
Date of collection	Parts per million	Percent satu- ration	Percent Phenols saturation C6Hg0H	Alkyl benzene sulfonate (ABS)	nitrogen as NH4	Nitrite (NO <sub>2</sub> )	Cyanide (CN)	Turbid- ity	Threshold odor
June 26, 1963				0.1				-	
				!				10	
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				7.				01	
				1				4	
Aug. 7				.1				ဖ	
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Aug. 21				1				ഗ	
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Sept. 25				1				65	

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### STREAMS TRIBUTARY TO LAKE ERIE -- Continued

4-1980, SANDUSKY RIVER NEAR FREMONT, OHIO

LOCATION. --At gaging station at highway bridge, 2.3 miles upstream from Bellville Power Dam, 2.5 miles downstream from Wolf Creek, and 3.5 miles southwest of Fremont, Sandusky Courty.
DANIANGE RESA.--1,248 square miles.

RECORDS (AVAILABLE,—Chemical analyses: October 1860 to Pebruary 1882, October 1962 to September 1963.

RECORDS (AVAILABLE,—Chemical analyses: October 1866) to September 1866.

Retain rempératures: October 1867 to September 1866, October 1866 to September 1863.

Retain rempératures: Maximum, 867 per 867 Sept. 10; minimum, not determined.

EXTREMES, 1862-6.—Dissolved solids (1860-22): Maximum, 864 ppm Nov. 1-10, 1861; minimum, 141 ppm Nov. 1-10, 1861; minimum, 141 ppm Nov. 1-10, 1861; minimum, 141 ppm Nov. 1-10, 1861; minimum, 141 ppm Nov. 1-11, 1861; minimum daily, 1864 micromhos Jan. 27, 1952.

Retain remperatures: Maximum, 187 ppg micromhos Nov. 4, 1861; minimum daily, 184 micromhos Jan. 27, 1952.

Retain remperatures: Maximum daily, 992 micromhos Nov. 4, 1861; minimum daily, 184 micromhos Jan. 27, 1952.

Retain remperatures: Maximum daily, 1861 minimum, 1862 ppm Nov. 4, 1861; minimum daily, 184 micromhos Jan. 27, 1952.

Retain remperatures: Nov. 1-10, 1862 micromhos Nov. 4, 1861; minimum, 1862 ppm Nov. 4, 1861; minimum, 1862 ppm Nov. 4, 1861; minimum, 1862 ppm Nov. 4, 1861; minimum, 1862 ppm Nov. 1862 p

district office at Columbus, Ohio. Additional samples were collected to further define the quality of water at this station.

Tur-bid-ity 111 ļ 400 i 15 Color 16 10 10 ł í 7.3 7.6 7.6 8.2 7.7 평 754 727 735 373 620 589 155 699 476 128 808 Specific conduct-(microat 25°C) 591 Chemical analyses, in parts per million, water year October 1962 to September 1963 (Composite analyses plus analyses based on maximum and minimum monthly specific conductance, and maximum monthly turbidity) ance mhos magne-carbon-182 187 183 80 158 601 124 24 137 171 191 165 Nonate Hardness as CaCO, Calcium 61 334 223 350 403 295 sinm Dissolved at 180°C) 177 176 197 238 101 136 (residue solids 2.3 17 20 17 trate (NO,) 1.5 2.2 2.2 7,2 12 18 14 14 Fluor.e.e.1 4.0 ø 87 ~ 50 'n ٦. 3 ride (F) 6.0 Chloride 12883 24 18 14 74 56 22 21 <u>5</u> Sulfate 8 176 159 159 58 601 116 139 86 168 187 157 210 190 206 108 176 8 214 140 218 258 158 Bicarbonate (HCO\*) 46 Po-tas-stum (K) 6.0 5.6 2.2 ł 1 Sodium (Na) 113 ŀ ŀ ŀ ŀ ł ļ Mag-nestum (Mg) 333 ŀ ŀ 1 i Cal-cium (Ca) 4886 ŀ ŀ ŀ 1 ł ł ł i í a.01 a.03 1 Fe) ŀ ١ ţ Silica (SiO<sub>2</sub>) 3.3 ŀ ŀ ŧ ł ł ŀ i ŀ 55.1 292 74.3 6655 discharge (cfs) 8 18700 1250 1390 144 234 901 turbidity)..... conductance)..... 11-31, 1962.... Nov. 1-30..... Dec. 1-6.... Mar. 4-31, 1963.... conductance).... turbidity)..... Apr. 1-30..... conductance)..... conductance).... conductance).... Date of collection Apr. 20 (maximum Mar. 18 (maximum conductance).. Mar. 4 (maximum Mar. 8 (minimum May 31 (maximum May 31 (maximum May 5 (minimum

a In solution when analyzed,

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1980. SANDUSKY RIVER NEAR FREMONT, OHIO--Continued

	Š	bid- ity	1	1	1	400	1	1	1	1	ł	1	!	!	:
		Color	I	I	1	1	1	1	1	1	1	1	1	1	ł
		띰	7.2	8.0	7.0	1	7.5	7.6	7.5	7.5	7.5	7.4	7.2	7.1	789 7.2
	Specific conduct-	(micro- mhos at 25°C)	209	838	475	1	716	826	640	808	873	742	852	896	789
	Hardness as CaCO <sub>3</sub>	Calcium, Non- magne-carbon- sium ate	132	163	66	1	172	215	147	212	239	187	191	206	171
tinued	Hard as C		278	380	218	1	339	409	300	386	434	345	381	414	350
1963Cor	Dissolved	(residue at 180°C)	381	544	296	1	464	558	406	535	612	486	554	634	518
ешрег	Ni-	trate (NO <sub>3</sub> )	10	3.4	24	1	2.4	2.0	2.6	1.4	1.8	1.1	1,1	6.	1.5
o Sept	Fluo-	ride (F)	0.4	.5	e.	1	ı.	е.		0.5	ŗ.	4.	s.	9.	.5
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued	9	(C1)	24	28	14	ł	34	32	30	36	38	35	48	62	40
year Octo	onle of	(SO <sub>4</sub> )	120	152	77	1	156	204	139	203	224	179	199	220	187
water	Bicar-	bonate (HCO <sub>3</sub> )	178	264	145	1	204	236	186	212	238	192	232	254	218
llion,	. Po	Sium (K)	1	i	1	ŀ	!	1	1	1	I	1	1	1	1
ts per mi		(Na)	1	1	1	}	1	1	ì	}	1	1	}	1	
in par	Mag-	sium (Mg)	1	1	1	ł	1	1	1	1	1	{	}	1	1
Livses.	Cal-	cium (Ca)		1	1	ł	ł	ł	}	ł	1	1	ŀ	1	1
cal ans		(Fe)	1	ł	ł	-	!	1	1	1	1	1	1	1	-
Chemi		(SiO <sub>2</sub> )	1	ł	١	1	١	1	}	1	1	1	ł	1	ì
	Mean	discharge (cfs)	314	256	1560	1010	44.2	45	34	50.9	19	28	15.0	11	22
		Date of collection	June 1-30, 1963	June 6 (maximum conductance)	June 11 (minimum conductance)	une 12 (maximum turbidity)	July 1-31	conductance)	July 17 (minimum conductance)	Aug. 1-31	conductance)	conductance)	Sept. 1-30	conductance)	conductance)

Additional analyses of special determinations

	hresh-	old	M-2	0	0	0	0	0
	-	sulfon- ate (ABS)	0.1	۲:	٦.	٦.	.2	.3
S		Unfil- tered	3	m	9	2	4	2
ermination	Oxygen consumed	Filtered	1	7	e	4	4	4
Additional analyses of special determinations	dissolved oxygen	Percent satura- tion	108	140	102	75	115	100
alyses of	Dissolve	Parts per million	10.8	12.6	8.4	5.7	9.4	9.5
lonal an	-soud	phorus as PO4	0,39	.31	.13	.61	8.	.53
Addit:		gan- ese (Mn)	0.15 0.03	1	2.8	.31	1.3	ю.
		Iron (Fe)	0,15	I	.57	.29	.12	.04
		Date of collection	Apr. 17, 1963	May 16	June 18	July 25	Aug. 30	Sept. 25

STREAMS TRIBUTARY TO LAKE ERIE--Continued

OHIOContinued	
FREMONT,	
NEAR	
RIVER	
SANDUSKY	
4-1980.	

	Aver- age		143	1   4	56 66 77	71 75 72
Temperature ('F) of water, water year October 1962 to September 1963		31	46	1 20	101	79
		30	35	1   22	53 67 76	53.2
		29	35 3	545	60 5 68 6 73 7	61 80 80 62 5
		28	34	118	64 80	71 77 63
		27	34.3	1 1 0 2	61 60 60 87	70 7 78 7 75 6
		26	35	116	828	70 78 47
		25	37	1 1 64	59 62 79 6	69 74 71
		24 25	51	1   4	53 59 82	71 72 70
		23	883	114	52 60 75	71 82 66
		22 23	41	1188	55 61 72	67 83 70
		21	48	118	588	71 6
		20	40	114	60 71 72	69 77 67
		16	41	115	67 79 79	67 68 80
	Day	18	65 44	1   2	64 70 79	76 69 76
		17	45	1   4	63	75 75
		16	71 43	37	54 65 79	68 77 75
		15	72 44	37	57 66 77	69 78 69
		14	72 47	35	56 68 74	59 72 70
		13	46	34	54 67 73	78 75 66
		12	45	1 1 98	53 66 71	76 83 68
		Ξ	72 47	1   45	53 65 74	70 83 79
		10	47	118	53 71 80	88 88 86
		٥	47	311	52 78 80	64 77 80
		œ	1 8 1	1 1 25	51 73 80	71 84 70
		2	47	311	54 72 78	75 85 71
		9	48 36	118	51 69 80	70 77 75
		5	48	311	50 60 79	72 59 70
		4	47	118	52 65 83	79 71 60 56 80 78
		က	50	111	58 66 71	79 60 80
		2	50	111	58 63 78	82 58 76
		-	48	111	55 60 72	81 61 80
	Month		October November December	January February	April May	JulyAugust

### STREAMS TRIBUTARY TO LAKE ERIE -- Continued

4-1990, HURON RIVER AT MILAN, OHIO

LOCATION. --Temperature recorder at gaging station, 500 feet downstream from bridge on U.S. Highway 250, 0.2 mile northwest of Milan. Erle County, and 2 miles downstream from confluence of East and West Branches.
DRAINGE ARGA.--563 square miles.
RECORDS AVAILABLE. --Chemical analyses: March 1950 to February 1952.
RECORDS AVAILABLE. --Chemical analyses: March 1950 to February 1952.
RECORDS AVAILABLE.--Chemical Analyses: Marximum, 1953 to September 1963.
EXTREMES, 1962-63,--March temperatures: Marximum, 87% June 9, 10, July 1; minimum, freezing point on many days during December

EXTREMES, 1953-63, -- Water temperatures: Maximum, 91°F July 27, Aug. 4, 1955; minimum, freezing point on many days during winter to March. months.

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	- Jê	age	0.4	6 4	N 01	8 8	e c.	6 1	<b>8</b> .C	80 SC	66	4.6	6.1	امر
	Aver-	ਲੋਂ 	5.0	43	32	32	32	39	5.0	58	69	81	79	73
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l	ĺ	30	4 4 5 6	33	32	32	11	53	8 4 8	69	73	4 7	76	58
		29	50	36	32	33	11	55	56	6.4	982	7.8	75	63
		28	50	36	32	32	33	5.0	53	63	94	85	7,0	17
		27	37	36	32	32	34	4 4 9	5 5	67	94	78	77	71
		26	39	38	32	33	33	64	064	69	92	96	78	29
e		25	47	38	32	88	33	4 6	59	5.5	79	96	77	69
1963		24	50	38	32	33	33	40	51	53	77	85	79	69
ber		23	55	38	32	33	33	35	51	51	75	84	81	69
tem (		22	57	41	32	35	33	39	59	55	74	82	81	72
Ser		21	56	410	32	35	33	38	53	57	73	73	69	71
to to		20	59	04	32	32	33	38	60	99	76	80	76	7.0
water year October 1962 to September 1 alcohol-actuated thermograph)		19	54	4 to	32	32	32	38	58	69	77	82	72	75
ed		18	59	43	32	32	32	39	55	71	79	86	75	77
tuat		17	58	4 6	32	32	33	39	63	68	74	82	75	73
- BC	Day	97	69	46	32	32	33	35	58	71	75	75	77	74
(°F) of water, water year October (Continuous ethyl alcohol-actuated		15	66	45	32	32	33	36	61	59	76	77	76	72
alc		14	65	4.5	32	32	33	35	58	70	74	76	73	71
, wa		13	57	44	32	32	33	33	5.8	57	71	79	77	71
ter		12	68	46	32	32	33	34	7. 80	53	69	90 70	79	75
T we		11	68	47	32	32	32	34	55	99	79	79	79	76
110		10	63 56	46	32	32	33	34	56	75	87	76	981	78
ႄ౾		6	62	4 5	32	32	32	33	53	78	97	74	82	79
ture		8	63	4 5 6 5	32	32	32	33	51	72	73	76	98	75
Temperature		7	63	44	32	32	32	32	604	56	82	78	83	73
remp		9	62	44	36	32	32	32	56	67 56	48 4 7 3	81 70	81	75
		2	64 60	4 4 4 4	37	32	32	32	53	69	117	69	83	75 69
		4	64	45	36	32	32	32	5.9	71	90 72	79	84	76
}		က	63	4 6 4 6	36	32	32	33	59	52	99	47	90	75
		2	58	44	35	32	32	33	60	44	11	95	92	74
ł		7	56	4 5	33	32	32	88	55	56	79	87	98	77
			11	1	11		11		11	11	11	11	1	11
	Month	Month	October Maximum Minimum November	Maximum	December Maximum Minimum	January Maximum Minimum	Maximum Minimum	Maximum Minimum	Aprıl Maximum Minimum	Maximum Minimum	June Maximum Minimum	July Maximum Minimum	August Maximum Minimum	September Maximum Minimum

### STREAMS TRIBUTARY TO LAKE ERIE -- Continued

4-2005. BLACK RIVER AT ELYRIA, OHIO

LOCATION, --At gaging station in Cascade Park at Elyria, Lorain County, 0.8 mile downstream from confluence of East and West Branches. DRAIMAGE ARE, --392 square miles. RECORDS YARLABLE. --Chencal analyses: October 1962 to September 1963. Water temperatures: October 1962 to September 1963.

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1963	
August	
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1962	
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million,	L
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parts per n	
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analyses,	-
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	Color	32	42	50	30	20	1	1			1	į	1	ļ	ł	1		ļ	1
	띥	7.5	7.3	7.2	2.0	7.4	7.4	7.3	1	7.	7.5	7.1	8.9	2.0	8.9	7.2	1		1
Specific conduct-	(micro- mhos at 25°C)	819	829	563	788	846	842	981	90.7	430	581	861	1160	986	1010	537	3	840	1
Hardness as CaCO,	nagne-carbon- sium ate	123	140	134	175	190	177	189		5	114	145	192	173	114	106		120	1
Hard as C		236	243	212	275	292	282	306	4 10	חמיז	224	280	286	270	207	185	010	707	
Dissolved	(residue at 180°C)			359				-				527				326	0,0	970	224
Ni-	trate (NO <sub>3</sub> )	7.3	22	17	22	23	24	27	-	2	9.9	14	37	22	13	12	,	23	8.4
Fluo-	ride (F)	0.7	9.	7.	.2	c,	9.	.53	٠	•	۲.	_	'n	_	_	0.2	L	٥.٠	0.1
Chlowide	(CI)	98	83	38	62	92	78	112	ç	20	37	78	120	97	130	42	8	20	29
oulfate	(30)	138	169	123	175	184	167	168	20	2	118	164	223	208	183	100	163	COT	69
Bicar-	bonate (HCO <sub>3</sub> )	138	126	95	122	125	128	142	8	8	134	164	115	118	114	96	3	177	99
Po-	Sium (K)	8.0	6.5	6.1	5.4	5.4	1	1		;	1	!	1	1	1	!		:	1
1100	(Na)	99	92	26	51	59	1	1		!	1	ļ	;	!	1	;		1	1
Mag-	sium (Mg)	16	19	17	22	28	1	1		!	ł	1	1	1	ł	;		-	-
Cal-	cium (Ca)	89	99	24	74	7.1	1	1		;	ł	;	ļ	1	1				1
	(Fe)	0.07	97.	.16	.03	60.	1	1		!	1	ì	1	1	}	1		:	1
	(SiO <sub>2</sub> )	9.1	9.5	8.4	6.6	9.0	;	;		1	}	1	1	1	1	1		:	1
Mean	discharge (cfs)	33.6	18.7	322	78.9	121	131	85.1	7	90/7	309	50.0	17.9	17.8	11.4	a226		;	
	Date of collection	Oct. 14-31, 1962	Nov. 1-9.	Nov. 10-21	Nov. 22-30	Dec. 1-11, 16-31	Jan. 1-31, 1963	Feb. 1-28		Mar. 1-01	Apr. 1-30	May 1-31	June 1-30	July 1-31	Aug. 1-31	Weighted average	Time-weighted	average	Tons per day

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Zoo cis.	1 determinations
analyses,	special d
r chemical	nalyses of
318 days of	Additional analyses of special determin
Mean discharge based on 365 days; mean discharge for 318 days of chemical analyses, 255 cfs.	Additional analyses of special dete
mean	
days;	
365	,
based or	
discharge	
Mean	

		Man-	-soud	Dissolve	Dissolved oxygen	Oxygen co	consumed	Alkyl	Thresh-
Date of collection	Iron (Fe)	gan- ese (Mn)	phorus as PO.	Parts per million	Percent satura- tion	Filtered	Unfil- tered	sulfon- ate (ABS)	old odor
Apr. 17, 1963	0.71 0.04	0.04	1.8		97	21	8	0.1	0
May 16	1	1	.71		62	4	9	۳.	0
June 18	.34	.29	.41		47	4	2	e.	Ds-4
July 25	.61	.16	.22	5,3	65	9	9	4.	A-2
Aug. 30	.19	30	.11		12	67	9	4.	0
Sept. 25	.27	.38	.26		24	7	7	.7	Cm-16

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-2005. BLACK RIVER AT ELYRIA, OHIO .- Continued

	į	bid- ity		1	ł	1	1	40	1	1	009	ŀ	1	1	ł	1	١	35
		Hd	7.2	7,3	7.6	8.0	7.6	1	į.	7.1	1	7.6	7.3	7.6	7.8	6.9	6.9	1
	Specific conduct-	(micro- mhos at 25°C)	1120	1140	489	1180	109	1	835	215	1	722	446	1000	629	1430	945	1
	Hardness as CaCO <sub>s</sub>	Non- carbon- ate	125	206	1117	206	151	1	1	46	1	168	06	168	112	129	167	;
bidity		Calcum, Non- magne-carbon- sium ate	256	326	186	346	229	ŀ	ł	77	ł	271	170	316	240	245	292	1
nthly tur	Dissolved	(residue at 180°C)	1	732	300	744	420	1	1	144	1	438	282	624	414	894	576	1
mum moi	Ni-	trate (NO <sub>3</sub> )	44	36	12	30	25	ł	1	8.2	1	23	5.9	23	5.8	32	14	1
d maxi	Fluo-	ride (F)	1	1.3	٠.	٠.	2.	ł	ł	۲.	1	8.	.2	4.	7.		ī.	}
Additional analyses based on monthly extremes of specific conductance and maximum monthly turbidity	SPT-CAD	(C1)	152	132	38	146	11	1	ł	12	1	9	28	85	46	165	92	1
ific condi	74-31.05	(30°)	133	206	100	204	128	ı	1	37	1	140	87	192	134	284	183	1
f spec	Bicar-		160	146	84	170	96	i	1	38	1	126	86	180	156	142	152	ļ
cemes	-ođ	Sium (K)																
thly ext	- 17-0	(Na)																
on no	Mag-	sium (Mg)																
s based	Cal-	cium (Ca)																
analyse		(Fe)																
ional		(SiO <sub>2</sub> )																
Addit	Mean	discharge (cfs)	18	38	767	110	65	127	40	4590	2260	139	378	24	126	9.4	23	11
		Date of collection	Nov. 4, 1962 (maxi- mum conductance)	Jan. 31, 1963 (maxi- mum conductance)	Jan. 13 (minimum conductance)	Feb. 12 (maximum conductance)	conductance)	rep. II (maximum turbidity)	Mar. 1 (maximum conductance)	Mar. 13 (minimum conductance)	Mar. 21 (maximum turbidity)	Apr. 18 (maximum conductance)	conductance)	May 25 (maximum conductance)	conductance)	June 28 (maximum conductance)	conductance)	turbidity)

9 102 245 116 .8 50 644 246 246 246 246 320 11.0 1.6 966 212 320 320 320 320 320 320 320 320 320 32	1080	845 7.7	1290 7.3	820 6.7	_
9 644 12 232 133 64 .4 12 516 516 644 12 130 14 12 516 14 134 106 .5 10 472 140 296 220 1.0 1.6 966	202	96	70	116	86
9	246	286	186	209	212
9 106 114 134 106 3 116 232 133 64 108 114 134 106	644	516	166	472	996
9 106 114 134 106 3 116 232 133 64 108 114 134 106	20	12		10	1.6
9 102 245 113 246 3 3 140 296	80	4.		.5	1.0
9 102	116	64	168	106	220
3 9	215	133	245	134	296
a co	54	232	102	114	140
10 89 89 6 6 7 17		68	60.00		£. 4
	July 22, 1963 (maxi- mum conductance)	July 24 (minimum conductance)	Aug. 28 (maximum conductance)	Aug. 6 (minimum conductance)	Sept. 26 (maximum conductance)

													1		, _	Day						1		Day								Aver
Month	_	7	6	4	5	•	_	80	6	10	Ξ	12	13	4	15	9_	17	18	18 19		20 21	22	23 2	24		25 26 27	27	28	29	30	31	age
October November	144	34	112	146	12%	345	164	144	444	44	3,1	144	161	96.1	8 4 1	94 94 34	64 34	3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	65 453 34	62 42 34	62 40 34	62 41 32	4,1	312	4 8 3 8 3 2	3.5 3.2	4.8 3.6 3.2	36	32 96	4 5 6 6	31 88	3461
fanuary February March	33 32	323	322	32	33	33	333	33	32	32	32 32 34	32 32 34	32	32	32 32 34	32 32 36	32 32 36	32 34 35	333	3 4 4 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	32	322	322	332		32 32 32 32 35 35		32 32 32 32 36 36	32	3818	38	32 32 34
April	8 4 5 7 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	38 49 58	38	500	500	50.00	9 0 G	500	50.00	50 50 50	0 0 0 0	50.00	0.00	3   6	0 1 4	40 52 64	42 52 66	4.2 5.2 6.6	42 52 66	4.2 5.2 5.6	4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	45 52 67	44 52 67	4 5 5 7 6 7	1 0 0 1 0 0	4 5 6 8 8	45 70	45 57 70	57 70	22.0	125	41 52 63
July			73 73 75 74 70 70	73	73	73	73	73	73 69	73	74 74 75 75 69 70	74 75 70	75	73	74 73 69	74 4 69	73 74 68	73	73 72 68	73		74 73 70 71 67 67	7.1	73 73 71 71 67 67		73 73 70 70 67	74 71 65	74 73 65	74 70 65	4200	121	0 73

4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO STREAMS TRIBUTARY TO LAKE ERIE -- Continued

LOCATION .-- At gaging station at bridge on Rockside Road, 1 mile northeast of Independence, Cuyahoga County, and 3 miles downstream from Tinkers Creek.

DRAINAGE AREA, -- 709 square miles.

Water temperatures: October 1948 to September 1949, October 1952 to September 1963. RECORDS AVAILABLE. -- Chemical analyses: October 1948 to September 1949.

Sediment records: October 1950 to September 1963.

EXTREMES, 1962-61-Water temperatures: Maximum, 83°F July 2, 3, 28; minimum, 37° on several days during December to February.

EXTREMES, 1962-61-Water temperatures: Maximum dally, 1,670 to from a minimum, 11,113,30 pm on many days during Duce and July.

Sediment Concentrations: Maximum dally, 1,670 to from Maximum, 1,1113,31,30 pm on many days during Duce and July.

EXTREMES, 1968-49, 1960-63.—Water temperatures(1948-49, 1952-63): Maximum, 88°F Aug. 18, 1949; minimum, freezing point on many days during winter months.

Sediment Concentrations (1950-63): Maximum dally, 4,800 ppm Aug. 21, 1960; minimum dally, 1 ppm Sept. 4, 10, 1955.

Sediment Concentrations (1950-63): Maximum dally, 35,300 tons Apr. 26, 1961; minimum dally, less than 0.5 ton on several days during August and September 1954, and September 1955. ARREMARS. -Diurnal fluctuations caused by powerplants above station. Flow affected by ice Dec. 8-17, Jan. 15 to Feb. 9, Feb. 22

Temperature (°F) of water, water year October 1962 to September 1963

															П	Day															Aver
Month		2	က	4	r.	9	-	80	6	9	=	12	23	4	15		17	88	19	20 2	21 2	22 23	$\vdash$	24 2	25 2	26 27	7 28	29	30	31	age
October Maximum	-		62	4,9	65	99	65	7,9	7,9	63	5.5	99	99	7,0	49	19	67 6	63	09 09	-	66 09		57 55		52 48	-	45 49		64	80	9
Minimum	5,0	9	62	62	9	49	62	63	63	61		65	_			4										4 4		64			
Maximum	4		64	64		6 4	4	8 4	8 4	8 7		8 7	7 8 4	80,7	7 8 7	8 4				4 9 4	94 94	_			77 77	42		42	2 42	}	
Minimum	4 8	8,	48	6 7	64	47	46	9 †	84	8 4	80	 00 1				-	4 8 4	94	4 9 4	_	40		7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		44 42	2 41	1 40	7		_	94
Maximum			44	42	43	43	0,4	38	3.8	37	36	35	35	35	34	34	35 3	37	37 3	37 3	37 3	36 3	36 36		35 35		35 34	34	3,4	35	37
Minimum	7	4.1	4.	4.1	45	0,4	37	37	37	36	_	35			_	_		_		_	_	_		_		_	_	_	_	_	
anuary Maximum		34		3.5	37	37	37	37	38	38	37	35		_							_				_						
Ε	34	34	34	34	35	3.7	37	37	37	37		35	34	33	33	33	33 3	35	35 36		34 3	33 3	33 33		33 33		33 34	34	34	34	34
		3.4	ť		3	3,6	3.5	36	6	3.6	3.7	3.7	4			- 1					37 3						36 35	- 1	- 1	- 1	
Minimum	3 7	33	9.6	3 6	3.6	3 6	36	, "				35			333	34	34.	340	37.6	36	36 35	_	34 34		34 35			-	1		3.5
				:	1	,		:	,									_										_		_	
Maximum	35	36	0 7	7 7	9	38	37	38	38	38	38	37	36	36		37	36 4	4 0 4		38	38 37		38 42	_		-		_	-	20	04
Minimum	_	35	37	0,4	38	35	37	38	37	38		36	_	_	35	9		_	38 3	_	_	_	1 39	_	45 44	7 7 7	4 45	4.6	6 4 9	_	
			0	9	ű	5		:	ű			-										-		_					-		
Minimum	4 6	21.0	5.0	2.0	6,7	4 6	200	215	100	2 4	2 6	2 0	10,4	200	22	200	510	220	380	2.00	55.0	53	53 51	_	50 53		54 56	28	5.5	1	32
														-			_											_		-	
Maximum	. 54	26	61	49	9	63	9	67	7.1	7	89	29	61	49	79	79	65	99	99	99	9 + 9	63	919	m :	65 68		69 89	69	67	9	65
Minimum			26	- 26	62	20	23	29	6.7	89		6				2							Λ					_	_		
Maximum	7.1	7	74	7.5	76	7.8	7.8	78	7.8	19	-	73		-5		73	_	_								_	79 79	_	-		
Minimum	99.		7.0	7.1	72	73	74	73	70	75	73	99	65	69	20	69	70 6	69	70 7	73 6	9 89	67 6	69 19	_	73 74	_		77	7 77	1	7.1
fuly			-	_ :	į	-				- 1							_				_					_			_	_	
Maximum	2 6	9 6	2 ,		, ,		9 -	<b>1</b>	7 0	2 ;	7 3	5 5	0;	2 2	2 2	 	1,6	0 6	300	200	7 6	2 :	16 79	_	81 82		82 83	95	2 77	7.	78
monst			:	7	7,	7	*	7	ò	0				_	_	2													_		
Maximum	79	4	7.8	11	78	7.8	7.8	80	81	7.8	11	17	192	4.4	7.1.7	10	707	11	72 7	70 7	72 7	74 7	75 75		73 73		73 72	7.2		7.2	7.5
Minimum	_		76	2	75	9,	76	77	7.8	75		92		_		6.0						-		_					2 7.1		
september Maximum	7.2	72	7.2	7.2	72	7.1	7.0	7.1	72	7.2	7.2	7.1	7.0	6.8	65	- 99	999	99	67	67	.9 89	67 6	65 64	_	63 63		94 94	- 65	5 64	- 1	6.8
Minimim	7.0		ï	,																											

### ST. LAWRENCE RIVER BASIN

### STREAMS TRIBUTARY TO LAKE ERIE -- Continued

### 4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Suspended sediment, water year October 1962 to September 1963 (Where concentrations are not reported, loads are estimated)

		OCTOBER			NOVEMBER	₹		DECEMBER	
		Suspen	ded sediment		Suspen	ded sediment		Susper	ded sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
1	212	37	21	241	31	20	188	30	15
2	198	40	21	275	29	21	176	30	14
3	190	16	8	266	28	20	162		13
4	304		40	282	27	20	176		14
5	238	21	13	253	25	17	201		16
6	403		85	218	24	14	411		40
7	291	14	11	183	22	11	352	i	25
8	298	]	25	169	2.0	9	320		20
9	304	49	40	160	19	8	300		20
0	226	43	26	4810	1060	S 16200	290		20
1	188	42	21	2960	536	S 5120	290		20
2	162	37	16	1340	223	807	260		18
3	178	29	14	930	155	389	240		16
4	132	20	7	800	100	216	230		16
5 • •	113	16	5	755	54	110	230		16
6	162	21	9	719	32	62	240		16
7	387		120	890	120	A 290	250		17
8	204	25	14	911		370	304		20
9	164	16	7	665	47	84	376		40
0	147	15	6	561	34	51	714		390
1	158	15	6	493	32	42	533		60
2	138	15	6	441	30	36	497		45
3	149	15	6	362	3.0	29	461		4.5
4	202	15	8	328	30	26	369		35
5	226	15	9	282	3.0	23	372		35
6	269	17	12	253	30	20	362		35
7	304	27	22	253	30	20	311		30
8	412	100	A 110	218	30	18	318		30
9	569		310	209	30	17	311		30
1	304 226	70 35	57 21	201	30	16	338	==	30 25
otal	7458		1076	20428		24086	9864		1166
Otal		JANUARY			FEBRUAR		-	MARCH	·
-+		- CANOARI			TEBROAK				
1	295	,	30	170		19	180		6
2	266		25 25	170		20 75	190		7 8
3	266 241		25	180 200		50	383	1	100
5	232		20	210	1	25	1900	490	A 2500
								1	
6	235	1 3	20	220		18	5010	1060	5 14200
7	235	1 1	20	250		75	3390	580	5310
8	256	1 1	25 35	300		35 25	2920 2990	430 350	3390 2820
9	266 435	1 1	140	260 241		20	2350	250	1590
				li	l	1			
1	1310	1 1	1500	223		18	1900	122	626
2 • •	1350		1400	220		17	3310	1000	A 8900 A 12000
3	935 683		380 240	201 190	1	15 13	5890 4070	750 400	A 12000
5	550		170	178	1	12	3730	450	A 4500
- 1			120	,		١,,			A 3900
7	430 360		120	173 173		11 11	3650 5240	400 725	A 3900 S 10600
8	310		80	173		13	4890	480	6340
9	300		75	335		95	4200	440	4990
ó	300		70	321		45	6060	780	5 12800
1	260		60	262	1	25	5050	358	4880
2	230		45	230		20	4010	355	3840
3	220		40	210		15	3400	382	3500
4	200		35	200	1	12	3200	321	2770
5	190		30	190		9	2530	285	1950
6	180		25	180		7	2190	292	1730
7	180		25	180		6	2610	271	1910
8	180		25	180		6	2230	176	1060
9	170		20				1950	180	948
0	170		20				1880	172	873
1	170		20				1740	154	723

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 1962 to September 1963--Continued (Where concentrations are not reported, loads are estimated)

		APRIL	+		MAY			JUNE	
		Suspen	ded sediment		Suspend	led sediment		Suspend	ed sediment
Day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day	Mean dis- charge (cfs)	Mean concen- tration (ppm)	Tons per day
				984		380	266		16
2	1600 1440	145 141	626 548	984		480	232	23	12
3	1300	240	A 850	770		220	185	18	9
4	2720	650	A 4800	630		150	159	16	7
5	1580	251	1070	566		120	190	15	8
6	1280	168	581	535	[	100	185	15	7
7	1130	130	397	493		85	178	15	7
8	1030	110	306	440		70	163	15	7
9	930	101	254	395	57	61	571	1640	
10	806	94	204	355	54	52	364		800
11	702	87	165	395	48	51	430		750
12	618	80	133	336	4.3	39	311	64	54
13	556	73	110	302	40	3 3	290	35	27
15	504	67 60	91 74	302 275	40	33 30	281 246	23	17 15
15	458	00	/4	213	1 40	30	246	22	1,5
16	465	53	66	252	40	27	208	20	11
17	482	51	66	240	40	26	172	20	9
18	919	300	A 750	246	40	26	169 159	18	8 7
20	838 2600		440 4200	235 266	40	25 29	148	16	6
í									
21	1240 878		550 210	293 260	3.8 3.5	30 24	152 125	29	12
22 • •	1050		170	240	30	19	120	10	3
24	1160		230	229	27	17	108	10	3
25	952		160	210	24	14	119	10	3
26	790		100	190	20	10	120	10	3
27	670		60	183	25	12	120	10	3
28	563		35	215		25	122	10	3
29	514		30	468		130	124	10	3
30	754		150	355		50	128	10	3
31				284	25	19			
Total	30529		17426	11942		2387	6145		4636
		JULY	,		AUGUST			SEPTEMBER	
1	114	10	3	185		35	106	1	5
2 • •	119	10	3	156		25 20	94 98	'	4
3	120 106	10 10	3	150 185	1	25	141	1 !	6
5	89	10	2	135		16	130	1	5
			_					1	4
6	100 100	10	3	144 159	1	16 16	111	1	4
7 8	101	10	9	150		14	161	1 1	6
9	108	10	3	135		12	172		5
10	107	10	3	144		12	198		5
11	92	10	2	113		9	150		4
12	95	10	2	97		7	344		150
13	91	10	2	113		8	284	1	50
14	124		14	142		11	161		В
15	139		2.5	125		9	119		5
16	111		4	109		7	95		4
17	120		20	105		6	109	1	4
18	164		25	159		50	118		4 5
19	135 186		16 30	107 198		7 40	150 144		5 5
	• • • •							1 :	
21	227		65	156		17	128	l i	4
22	141		18	139	;	9	124	1 1	4
23	237 174		75 19	126 142	1	7 8	120 144		4
25	178		12	141		8	135		4
			8	113		6	144		4
26	142 112		6	113		7	133	+ 1	4
28	126		7	116		6	126	i i	3
29	407		180	120	1	6	128	1	4
	420		300	118		6	128	1 1	4
30									
30	181		41	122		6			

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1962 to September 1963 (Methods of analysis: B, Dottom withdrawal tube; C, Chemically dispersablishin, N, in native water; D princh: S, sieze, V, visnal arcumulation tube. W in distilled water!

	Mathod	jo .	analysis	SBWC	SBN
			2,000		
			1.000		
		eters	0.500	100	
		millim	0.250	96	3
	iment	ated, in	0.125	98	80
	Suspended sediment	Percent finer than size indicated, in millimeters	. 016 0. 031 0. 062 0. 125 0. 250	95	35
	Suspen	han siz	0.031	91	16
water)		finer t	0.016	77	9
Parme		Percent	0.008	53	42
, III G		[	0.004	46	28
me,			0.002	29 44	07
P, pipet; 3, sieve; v, visual accumulation tube; w, in distilled water	Codimont	discharge	(tons per day)		
o, sleve; v, vii	Sediment	concen- tration	(mdd)	726	2330
r, piper;		Discharge (cfs)		6550 862	298
	Water	per-	(°F)		
	Som 2	ling	point		
		Time ling per-		0040	0000
		Date of collection		Mar. 13, 1963	June 9

### STREAMS TRIBUTARY TO LAKE ERIE -- Continued

### 4-2122. GRAND RIVER AT PAINESVILLE, OHIO

OCATION. --At bridge on State Highway 535 in Painesville, Lake County, 2.2 miles upstream from mouth, and 8 miles downstream from Kellogg Creek.

DRAINAGE AREA. -- 712 square miles (at moutb).

RECORD MAILIBLE.—Chemical mailyses which 1950 to February 1952, October 1962 to September 1963,

RECORD MAILIBLE.—Chemical mailyses which 1950 to February 1952, October 1962 to September 1963.

Rater temperatures: Marximum, 77.500 ppm Oct. 12-23; minimum 1.190 ppm Nov. 10-14.

Ratchess, 1962-63. Marximum, 68°F July 28, minimum, 7500 ppm Oct. 12-13; minimum daily, 332 minimum, 80°F July 28, minimum, 15.600 minimum, 15.600 ppm Aug. 9, 1960; minimum, 1960 ppm Aug. 9, 1960 ppm Aug. 9, 1960 ppm Aug. 9, 1960 ppm Aug. 9, 1960 ppm Aug. 9, 1960 ppm Aug. 9, 1960 ppm Aug. 9, 196

River near Madison,

Grand

Density (at 20°C) 1,002 1.001 1 1 1 111111 1.001 į Color 17 20 22 15 11117 11 ł 1 ŀ ŀ ł 6.8 Ï 핌 12800 6620 9330 2020 5280 8800 8800 10400 9630 9380 3890 5500 9680 3630 7730 conduct-(micromhos at 25°C) 4340 l ance 3780 1810 2820 496 1530 2790 964 2830 982 1100 2390 2500 3080 2840 3340 2210 magne-carbon-Nonate Hardness as CaCO, Calchum 840 1600 1600 3890 1600 2440 2550 3140 2890 558 1580 2260 sium Chemical analyses, in parts per million, water year October 1962 to September 1963 Dissolved 7500 3830 5580 1190 5920 2480 3730 6780 2510 5160 5620 6280 5840 7110 4860 3060 (residue at 180°C) solids 5.8 1.1 11 1 trate (NO.) 11 11 1 1 Niŀ <u>- 27.1.1.</u> 001140 Fluo-14440 0.2 0.2 ride (F) Chloride 4260 2080 3150 530 1650 3150 1180 1700 3250 1100 2740 2900 3380 3250 1400 2490 (CI) Sulfate (SO<sub>4</sub>) 108 85 94 56 86 106 82 86 360 150 120 113 134 (HCO,) 71 81 60 75 65 66 77 70 70 70 62 65 68 64 70 67 29 Bicarbonate 64 Po-tas-sium (K) 7.9 6.2 8.4.6 4.9 1 ŀ 1111 11 ŀ 1 Sodium (Na) 1140 559 840 143 361 1 11111 ŀ Mag-ne-sium (Mg) 16 30 16 26 111 28 i 11 11 1 ŀ Cal-clum (Ca) 673 673 100 197 592 ļ ļ 365 1111 1111 0.15 1 881111 11111 ì Iron (Fe) 1 Silica (SiO<sub>2</sub>) ì ١ 111 1111 l 106 79.3 12.7 discharge (cfs) 15.8 ţ ţ 216 409 382 134 2184 657 10-14 1-8. 9-10, 12-31.... June 1-30..... 12-23, 1962 a.. 24-31, b..... 15-30..... 1-31, 1963.... 1-28..... 1-31..... Apr. 1-30..... 1-31..... July 1-31..... ........ Sept. 1-30.... Weighted average.. average..... Tons per day ..... Date of collection Time-weighted Aug. 1-31 Nov. Dec. Jan. řeb. la y

a Includes 0.1 ppm ammonia nitrogen as NH4 and 2.5 ppm nitrite (NO2). b Includes 0.1 ppm ammonia nitrogen as NH4 and 0.00 ppm nitrite (NO2).

STREAMS TRIBUTARY TO LAKE ERIE -- Continued

4-2122, GRAND RIVER AT PAINESVILLE, OHIO .- Continued

Analyses based on monthly extremes of specific conductance and maximum monthly turbidity

1	Density (at 120°)	1	ł		1	ŀ	1,003		;	ł	1		1	1		;	!		;	1		1,002	1	i
Pr-	bid- ity	1	1		1	1	1		1	20	1		1	200		;	1		1	1		1	1	10
	Hd	8.9	7.5		7.1	7.6	7.2		7.4	1	7	:	7.3	1		8.	7.0		9.3	7.3		8.9	7.1	-
Specific conduct-	mice mhos at 25°C)	16400	1160		10100	1740	15600		7200	1	13400	)	332	1		7100	970		14400	3170		12400	4300	1
Hardness as CaCOs	Calcium, Non- magne-carbon- sium ate	5490	300		3170	442	5080		1920	1	4450		74	1		2110	215		4870	834		3720	1110	ŀ
Har as C	Calcium, magne-c sium	5520	348		3240	200	5130		1990	1	4520		104	1		2180	268		4920	892		3760	1160	-
Dissolved	(residue at 180°C)	1	738		1020	1180	10300		2030	1	9240	2	244	1		2090	724		9300	2100		1100	2690	1
ï.	trate (NO <sub>3</sub> )	İ	4.1		-	5.2	1		1	1	ŀ		3.3	ł		ļ	3,1		!	1		;	1	1
Fluo-	ride (F)	ŀ	0.0		œ.	.2	7			1	c	:	.2	1		۰.	۲.		!	1		٦.	٠:	1
ونيواخل	(C1)	5800	285		3400	460	5490	. !	2300	1	4750		61	†		2150	228		2300	940		4240	1300	ŀ
0.16040	(SO*)	150	84		106	61	329		330	ł	1		52	1		200	43	,	125	55		100	63	!
Bicar-	bonate (HCO <sub>3</sub> )	39	28		87	20	28		6	1	8	}	36	!		08	64		er er	20		20	65	1
Po-	Sium (K)																							
1	(Na)																							
Mag-	ne- sium (Mg)														.,									
Cal-	ctum (Ca)																							
2	(Fe)																							
901100	(SiO <sub>2</sub> )																							
Mean	discharge (cfs)	25	2320		140	1400	140		200	150	œ	8	6870	10100		228	1500		82	175		120	142	205
	Date of collection	Oct. 17, 1962 (maxi- mum conductance)	Nov. 12 (minimum	Jan. 29, 1963 (maxi-	mum conductance)	conductance)	Feb. 1 (maximum	Feb. 9 (minimum	conductance)	turbidity)	Mar. 2 (maximum	Mar 20 (minimin	conductance)	Mar. 18 (maximum turbidity)	Apr. 19 (maximum	conductance)	conductance)	May 22-23 (maximum	conductance)	conductance)	June 1-2 (maximum	conductance)	conductance)	June 15 (maximum turbidity)

a Sample contained 28 ppm carbonate (CO3) and 2 ppm hydroxide (OH).

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4-2122. GRAND RIVER AT PAINESVILLE, OHIO--Continued STREAMS TRIBUTARY TO LAKE ERIE -- Continued

Density 1,003 (at 120°) 1.003 1,004 1 T Tur-bid-ity 8.9 9.9 6.0 6.3 6.5 6.7 펎 ance (micro-mhos at 25°C) 6810 Specific conduct-13900 13500 4730 8460 14600 (residue Calcium, 180°C) magne-carbon-4360 1990 4410 1120 4920 2250 Hardness as CaCO, Analyses based on monthly extremes of specific conductance and maximum monthly turbidity---Continued 4410 2040 4470 1160 4960 2320 Dissolved 8610 4260 3640 9010 solids 8300 5080 Ni-trate (NO<sub>3</sub>) 1 l 1 ŀ i ŀ Fluo-ride (F) 0.3 7 <u>د</u>. 2 2 5 Chloride 4770 2120 1460 5090 2720 <u>5</u> Sulfate (SO<sub>4</sub>) 68 108 64 16 1, 1, Bicarbonate (HCO<sub>3</sub>) 62 64 70 48 44 82 Po-tas-sium (K) Sodium (Na) Mag-ne-sium (Mg) Cal-cium (Ca) Iron (Fe) Silica (SiO<sub>2</sub>) Mean discharge (cfs) 9.9 2.4 36 140 12 58 Sept. 14-15 (maximum conductance)...... Sept. 20 (minimum conductance)..... mum conductance)...
July 31 (minimum
conductance)..... conductance).....
Aug. 2-3 (minimum conductance)..... July 30, 1963 (maxi-Date of collection Aug. 27 (maximum

	ı		,					
		old odor	0	8-5	A-8	A-8	0	0
	Alkyl	benzene sulfon- ate (ABS)	0.3	e.	۳.	4.	4.	۳.
ns	nsumed	Unfil- tered	2	2	7	9	9	9
terminatio	Oxygen consumed	F11tered	1	4	7	4	7	5
Additional analyses of special determinations	Dissolved oxygen	Percent satura- tion	88	69	78	99	84	79
nalyses o		Parts per million	8,4	6.2	6.4	4.2	6.4	6.3
tonal a	-soud	phorus as PO4	0.24	.27	.04	90.	00.	.16
Addi	-uen	gan- ese (Mn)	0.32 0.24	Ξ.	97.	.05	9.	90.
		Iron (Fe)	0.32	. 22	Ξ.	90.	90.	.04
		Date of collection	Apr. 17, 1963	May 17	June 19	July 26	Aug. 30	Sept. 25

118

36 38

55 78 78

84 82 79

Aver-age

4-2122, GRAND RIVER AT PAINESVILLE, OHIO--Continued STREAMS TRIBUTARY TO LAKE ERIE--Continued

	ł.					
		31	35	35	72	300
		30	52 47 36	0 1 %	62 70 85	87 77 75
		9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	50 47 38	6 1 3	62 62 70 70 84 85	85 87 79 77 76 75
		28	340	34 38 38	60 70 82	86 88 75 80
		27	35	38	58 70 82	86 75 76
		26	44 000 44	38	58 57 69 70 80 82	86 85 78 77 74 78
63		25	52 45 34	33	5.8 8.0 8.0	86 74
r 19		24	3246	333	52 58 66 67 77 78	85 87 83 75 78 75
mbe;		23	24 23 33	38	52 66 77	85 83 78
pte		22	4 9 4 4 9 4	35	60 58 69 68 74 76	86 86 83 82 80 78
й ()		21	70 43 35	3.5	69	8 8 9 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
1962 to at 0830)		20	70 72 44 44 34 33	35 35	55 58 70 70 78 77	87 85 83 82 78 80
ure (°F) of water, water year October 1962 to September 1963 (Orce-dally measurement, usually at 0830)		16		37		
°F) of water, water year October (Once-daily measurement, usually		18	70 44 33	36 2 3	56 55 70 68 77 78	20 80 20 00
Oct		17	72 47 33	36 35 35 35	-	85 78
ear nt,	Day	16	76 76 45 50 32 32	33 35 33 35	54 54 69 68 74 75	82
r y		15				83 82 75
wate		14	75 444 32	35 35 40 42 35 35	50 52 67 68 73 72	85 82 84 85 82 78
er,		13	75			
wate ail		12	76 44 45 32	35 34 38 38 35 34	7.5	8 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
e d		-			50 67 78	82 83
(P. 0)		10	58 56 35 33	40 40 38 36 35 34	53 51 68 68 82 80	85 87 85 87 81 82
Le L		-	_			
atu		80	331	36	52 52 64 65 78 80	85
Temperature		7	1.428	0 4 4 0 4 8		85 85 80
Teı		9	122	4 4 5 2 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	78	85 85
		2	55	8,44 0,4	80 00	98.8
		4	1.00	38	60 45 60 58 75 78	3 8 8 8 8 8 9 8 9 8
		3	1 6 4	37 40 40	_	83 82 83
		2	51	34 36 38 42 40 38	55 58 54 55 74 75	5 87 85 85
	_	_	. 52			8 8 5 8 3
	N. Carlot	INDIDIA	October November December	January February March	April May June	July August September

### STREAMS TRIBUTARY TO LAKE ONTARIO

# 4-2320. GENESEE RIVER AT DRIVING PARK AVENUE, ROCHESTER, N. Y.

lOCATION.--At gaging station at Nochester, Monroe County, 40 feet downstream from plant 5 of Rochester Gas and Electric Corp., and 100 feet upstream from Priving Park Avenue Bridge.

DRAIMCA AREA.--2,467 square miles.

RACORDS ARIALBLE.--Chemical analyses: October 1954 to September 1955.

Water temperatures: October 1954 to September 1953.

EXTREMES, 195263.--Water temperatures: Maximum, 79°F July 2, 3, (p.m.), 25-27, (a.m.); minimum, freezing point on several days INSTREMES, 1954-33.--Water temperatures: Maximum, 83°F Aug. 4-6, 1955; minimum, freezing point on several days in 1955, 1956, 1966, and 1963.--Water temperatures: Maximum, 83°F Aug. 4-6, 1955; minimum, freezing point on several days in 1955, 1956,

Temperature °F of water, water year October 1962 to September\_1963

						Temp	Ú	Twice-daily	٦		measurements	measurements	ente	at	app	at approximately 1000	mate	l,	00	and	and 1600	16007			ĺ						
4															Day																Aver-
Month	-	2	က	4	2	9	-	80	6	2	11	12 13	13 14	12	16	11	18	19	20	21	22	23	24	22	56	27	28	29	30	31	age
October								-		-		-																		-	i
E.Q.	68	65 65	650	63	63.6	63	64 6	6 63	63 6	63	63 63		63 63 62 62	63	63	63	63	61	61	61 61	58	58	54	53		N N	55	. 53	5.1	51	09
November								_		_															;		:		:	:	,
a.m	50	20	20	50	50	20	64			7 64	46 45	_	45 45	45		_	45	1	45	43	43	42	42		0,4	40	40	0,4	40	!	45
p.m	2.1	51		_				6,4	5 6 7	-	4.5				4 4	_	4.2	7,7		4.2	7 4	45	<b>4</b> J		4 1	0,4	4 1		0,4	-	4 5
а.ш	0 7	39		-		39		_		_					33	33		33	33	33	3.3	33	6	33	34	34	3,4	5	34	33	3.5
p.m.c.	0 7	38	39	39	38	_	39 3	39	36	35	35 34		34 33	34			33	33	33	33	32	32	33	9	35	7 7	4		33	. 60	3 15
January				_	-	_	_		_	_				_		_	_	_								_			_		;
a.m	33	33	33	33	34	33	33	34	34		34 37			33	33		_	34	35	34	34	34	33	32	32	33	35	33	33	33	34
Pohmarv	33	37	37	37	35				36	34			33 33			33	34	34	35	35	33	32	32	32	32	33	33		33	33	34
a.m	33	3.3	33	7,5	77.	_	3.7		3.8	37	37 38		37 36	3,6	3.6	2		34		33		35	3.4	3.4	3.4	33	4	1	1	1	ď
	000									_						_	3.5	ì		1 0										_	, ,
March	ŗ.	2		· ·		_				_								5	0	0	<u>,</u>	<u>,                                     </u>	2	9	2	0	t n	_	-		÷
a.m	35	3.5	34	3.5	35	_		35		_	35 36	_	35 35	3.5			37	37	37	37	37	36	37	0 4	0 4	4 0	1 7	0,7	42	40	37
m.d	34	34	3.4	34	34	34	35 3	_	35 3	35	35 36	_		_	35	37		35		35		35	37	4.1	0 %	44	4.5	45	44	4	37
April		_	_			_		_	-				_	_		_					_										
a.m	94	94	-	94		_		-		7 7 7 7	44 45	_	55 55			_		94		94	9	46	9 4	47	47	47	47	47	47	1	94
	45	47	7 2 4	_	45	7 7	47	- 24	47	_				4 89	4	4 8	8,	47	46	94		46	9 †	46	46	46	94	9,	94	ł	46
May								_		_								i							;	,	-				
а.ш	4.5	20				9 1		87		8,1		-	47 50		7		ð,	7	7,	5	5	5	7	7	54	0	61		61	0 9	25
D. C.	43	4 5	9 7	40	7		4-	_	7 8 7	_	47 52		51 58	58		9	_	5		25	25	25	53	23	25	5	96	26	09	09	25
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# STREAMS TRIBUTARY TO LAKE ONTARIO -- Continued

4-2375. SENECA RIVER AT BALDWINSVILLE, N. Y.

LOCATION. -4. 10ck 24, Baldwinsville, Onondaga County, 350 feet upstream from gaging station.
DRAINAGE AREA.-3;130 square miles.
RECORDS ANIILABLE.-Chemical analyses: October 1957 to September 1958.
RECORDS ANIILABLE.-Chemical analyses: October 1957 to September 1958.
EXTRACES: 1957-63.-Chemical September 1957 to September 1959.
SXTRACES: 1957-63.-Marc remperatures: Maximum, 81°P July 29, 30; minimum, freezing point on many days in February and March.
RECORDS: 1957-63.-Marc remperatures: Maximum, 81°P July 29, 30; minimum, freezing point on many days during winter morths.

Temperature °F of water, water year October 1962 to September 1963

Aver-	age	4.08 1.08	32	4 2 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	76 73 66
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	27	52 40 33	32	51 61 73	80 72 62
	26	52 40 34	32	51 61 71	78 72 62
	25	54	33	59	78 72 62
	24	55 42	32	52 59 68	77 72 62
	23	57 42 	32	52 60 67	77 72 64
	22	43	33	51 61 68	76 72 65
Day	21	59 41 33	333	51 60 70	75 70 66
	20	59 41 34	34	51 60 72	7.7 70 67
	19	59 42 34	35	52 59 70	76 70 66
	18	5.9 4.4 3.4	33 35	53 60 69	4 6 9 9 9
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		54	33	47 58 67	47 11 69
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	_	. 60	32	57	
;	Month	October November December	January February March	April May June	July August September

## 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:

KKUCKUNS AVAILABLE.-Water temperatures: October 1955 to September 1963.
EXTREMES, 1965-63.—Water temperatures: Maximum, 70°F July 29; minimum, 33°F Apr. 2, 4, 5.
EXTREMES, 1955-63.—Water temperatures: Maximum, 74°F Sept. 10, 1959; minimum, 33°F on many days during winter months.
EXHREMES, 1955-63.—Wasterements made by plant employees, five feet below surface in tailrace of the Moshier Falls hydroelectric station.
No discharge records available.

4	u i				
Aver-	ge	84 6 80 98	8 8 8 8 8 4	36 49 60	66 66 62
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	29	38 38 35	35	40 40 40 40	70 <b>65</b> 59
	28	46. 88.0	35	38 54 65	69 66 58
	27	350	35 34 34	38 54 63	69 65 60
	26	38 34	35	8 4 6 4 6 3 8	69 65 59
	25	52 38 34	35 34 34	38 53	68 65 59
	24	52 38 34	34	37 52 61	6.5
	23	36	35 34 34	50 20 20 20 20 20 20 20 20 20 20 20 20 20	6.6
	22	36	34	5 2 8	68 66 61
	21	383	35	38 52 59	6.5 6.5 6.2
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	-	57 45 38	35 35 34	400	66 63
Moneh	Month	October November December	January February March	April May June	July August September

## 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. DALIANGE AREA.--1,876 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1956.

Water temperatures: October 1955 to September 1959, July 1952 to September 1963.

Water temperatures: Maximum, 81°F July 29 minimum, 34°F on many days in January, February, and March.

EXTREMES, 1955-59, 1962-1963.--Mater temperatures: Maximum, 81°F July 29, minimum, 34°F on many days during winter

Temperature 'F of water, water year October 1962 to September 1963 /Once-daily messurement at approximately 09307

												Ω	Day															Aver-
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on

### ST. LAWRENCE RIVER MAIN STEM

# ST. LAWRENCE RIVER AT ALEXANDRIA BAY, N. Y.

Engineers river-stage gage at Alexandria Bay, Jefferson County. October 1955 to September 1963 of LOCATION. --Off pler behind post office at the Corps DRAINGE RREA. -296,500 square miles, approximately. ROCOMDS AVAILABLE. -- mater temperatures: October 195

freezing freezing point September 1959; minimum, minimum, 28 (p.m.), 29-31, and Aug. 1; several days in August and Maximum, 72°F July o 75°F EXTREMES, 1955-63. -- Water temperatures: Maximum, EXTREMES, 1962-63. --Water temperatures: during December to March.

records available discharge No REMARKS, -- Stream frozen Dec. 30 to Mar. 31. days during winter months. many

MISCELLANEOUS ANALYSE: OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN

	pH Col-
	Hq
	Specific conduct- ance (micro- mhos at 25°C)
	Hardness   Sodium   Specific
	Hardness as CaCO <sub>3</sub> Sodium Cal- Non- ad- cium, car- Sorp- mag- bon- tion nestum ate ratio
	Hard as Cal- clum, mag- nesium
er 1963	Dissolved
Septem	Boron (B)
to	Ni- trate (NO <sub>3</sub> )
r 1962	Fluo- ride (F)
Chemical analyses, in parts per million, water year October 1962 to September 1963	Suifate Chloride Fluo- Ni- Boron solids $CaCO_2$ Socium conducte (SO <sub>2</sub> ) (CI) (F) (NO <sub>2</sub> ) (NO <sub>2</sub> ) (CI) (F) (NO <sub>2</sub> ) (CI) (F) (NO <sub>2</sub> ) (CI) (F) (NO <sub>2</sub> ) (CI) (CI) (CI) (CI) (CI) (CI) (CI) (CI
water ye	Sulfate (SO.)
ion,	Car- oon- ate (CO <sub>3</sub> )
r mill;	Bi- car- bonate (HCO <sub>3</sub> )
ts pe	Po- tas- sium (K)
, in par	Man
alyses	Mag- ne- sium (Mg)
ical an	Cal- cium (Ca)
Chem	Man- ga- nese (Mn)
	Iron (Fe)
	Alu- mum (Al)
	Silica (SiO <sub>2</sub> )
	Discharge (cfs)
	Date of Discharge Silica mi- iron ga- Cal- ne- Sodium tas- car- bon- Sulfate of Cilection (cfs) (SiO <sub>2</sub> ) num (Fe) nese cium sium (Na) sium bonate ate (SO <sub>2</sub> ) (CA) (MI) (Ca) (MR) (CA) (CA) (CA) (CA)

STREAMS TRIBUTARY TO LAKE SUPERIOR

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	39 62 25
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Y, MINN.	4.0
4-145. BAPTISM RIVER NEAR BEAVER BAY,	5.0
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VER N	000
ISM RI	34 64 19
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4-145	2.0 5.6
	3.7 5.4
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	0.04
	0.44
	3 15 6.6
!	158 4.3 199
i	Sept. 25, 1962 Feb. 27, 1963 Apr. 17

# MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN

-	Tur- bid- ity
	issolved oxygen rts Per er sent er satu- on tion
	Dis ox part per mil-
	Col
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	Specificonduc conduc ance (micro mhos
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9	Hardness as CaCO <sub>3</sub> as CaCO <sub>3</sub> Cal- Non-cium, car-mag-hesium ate
mber 196	Dissolved solids (residue at 180°C)
Septe	phos- phor- us as (PO4)
52 to	Ni- trate (NO <sub>3</sub> )
r 196	Fluo- ride (F)
hemical analyses, in parts per million, water year October 1962 to September 1963	Chloride (C1)
ater ye	Sulfate (SO4)
n, w	(3) at 20 (3)
m11110	Bi- car- bon- ate (HCO <sub>3</sub> )
per	Lith- ium (Li)
parts	Po- tas- sium (K)
ses, in	Sodium (Na)
analy	Mag- ne- sium (Mg)
mica1	Cal- clum (Ca)
Che	Man- ga- nese (Mn)
	Iron (Fe)
	Silica (SiO <sub>2</sub> )
	Hardness   Specific   Hongon
	Date of collection

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

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00t. 5. Apr. 24 Nov. 14 Nov. 14 Apr. 24 Apr. 24 Apr. 9, Apr. 9, Apr. 9, Apr. 9, Apr. 9, Apr. 10		196 1, 19		19	196		), 19	, 19	, 19
A A A A A A A A A A A A A A A A A A A		r. 24 r. 14 r. 10		8. 24	۲ 9,		1y 2C 3. 24	r. 25	r. 10
		APP APP		Aug	NO		Ju A	Ap	Ap:

STREAMS TRIBUTARY TO LAKE MICHIGAN

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	68 73 46 89
.•	4.08.04
MICH	1.10.14.
UMBOLDT,	1.0
KIVER AT H	7.0 11 8.8 13 8.0
ESCANABA I	50 30 38 34
E BRANCH	5:11
	1.4
4-578.	6.19
	13 4.8 
	22.28
	1.9 .31 .95
	12 9.3 20.1
	9.7 28 326 24 10
	1961 1962 1963
	20, 26, 14,
	July Dct. Apr. Nov.

MICH Continued
HUMBOLDT,
RIVER AT
ESCANABA 1
BRANCH
MIDDLE
4-578.

Apr. 4, 1903.	378	0.0.i	118	115	11	1 1	1	11	118	110	115		11		4.6	1	4 4 2	1 1 9	999		
July 26		1	31	3 1			1	1 1	26	9.1	: 1	- 1		1			105	1		1	3.5
					4-578.	.2. MIL	DLE BR	ANCH ESC.	ANABA RIVE	4-578.2. MIDDLE BRANCH ESCANABA RIVER NEAR GREENWOOD, MICH	SENWOOD,	MICH.									
Apr. 25, 1962		⊢-	0.29 6	0.03		_			80 0	8.8	1.0		8.0	56	16	10	38	t	70		0.3
Apr. 9, 1963.	240	6.2	.50	.15					18	8.8	2.0		11	2		- 4	56 6	6.3	0	_	7 -
							4-578	4-578.5. BLACK RIVER	RIVER NE	NEAR HUMBOLDT,	DT, MICH.					!					
July 20, 1961	1.5	3.8	0.91 a	1,11					8	3.8	1.5		2.7	-		ł	36 5	5.6 18	2		-
Aug. 24	1.	6.4	.57 a	a.00				_	27 0	90.0	1.0		4.	98	14	₩ 0	36 6	6.3 170	0 9		7
Apr. 26, 1962 Nov 15	50	• • <u>~</u>	00.0	50.					7 4	0,00	J. 2		1.1	1.59		0 4	44	3.4	2 9		°-
Apr. 9, 1963.	30	6.1	.59	13			_		9	6.4	2.0		; ;	1		S	31 5	5.8 10	0		4.
			4-57	78.55.	LAKE	CORY OU	TLET (	UPPER ST.	ATION TRIE	4-578,55. LAKE LORY OUTLET (UPPER STATION TRIBUTARY TO BLACK RIVER) NEAR HUMBOLLDT,	BLACK RIV	TER) NI	EAR HUMB	OLDT, MICH	H.						
Oct. 2, 1961.		-	0.34 0	111	-	H			54	10		ľ	0.4	96		9	117 7		r3		4
Apr. 26, 1962		8.0	2.0	.36					25	16			6.	69		9 0	906	6.3	9.9		110
Nov. 15		_	.47			-	_		72	14			0.1	128		N C	120		2 4	_	m (
Apr. 5	- · ·		11	1 1			-		° ¦	0 1	?		?	100	25	P	99	65	2 10		y =
						4-5	78.6.	MCKINNON	4-578.6. MCKINNON LAKE OUTLET		NEAR HUMBOLDT,	MICH.									
Oct. 2, 1961.	10	9.6	3.1	3.6					32	17	2.0		0.6	94	32	12	102 6	6.5	35 8	8.9 75	190
Nov. 15	1.5			.05					88	4.	0.8		38	244		·	338		0 1	_	40
Jan. 14, 1963		 ¦		1 1	-				B 1	4.9	0.		7.6	261			168		0.0	_	7 0
Apr. 9		11		10	_				24	37	0.6	. 3'	45	182			267		2 0		œ
Apr. 24				1	-			_	06	25	7.0	_	ī	1			253 7		5		15

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

	Tur- bid- ity	1							1			7.0			4010	
							2 4			*		0 4			4040	+
i				8.6 92	9.8		11		8.0 86	*			$\dashv$			_
	Disse oxygrants or per mil-			180	001	30	8 20		46	130		100			80 80	-
	нd			6.9	9.0	7.2	75 129 6.4	İ	8.0	9 9 9		9 9 7	6.7		10.57	
	Specific conduct- ance (micro- mhos at 25°C)			112	97	2173	129		77	62		360	111		8 8 4 8 8 8 7 8	
eq				10	15	38	26		100	12.4		-82	100		8 - 02	Ī
September 1963 Continued	Hardness as CaCO,  Cal- Non- cium, car- mag- bon- esium ate		ICH.	20	30	103	28		1 8 5	30		36	23		15 40 20 44	-
963C			IC, M	-6	104	150	106		99	1 88 2		36	П		284	-
mber 1	phos-Dissolved phor-solids as (residue (PO <sub>4</sub> )at 180°C)		REPUB													1
Septe	Ni- ph Ni- ph trate u (NO <sub>3</sub> ) a		NEAR	1.4	2.5	w 67	5.0		8.6.	4.5.1		1.0	1 1	₩.	11:00	-
62 to	Fluo-	9	II VER)			0100			10.0		MICH.	0.0		, MICH		1
water year October 1962	Chloride (Cl)	STREAMS TRIBUTARY TO LAKE MICHIGANContinued	BLACK 1	2.0	0.0	2.0	5.0	, MICH.	1.0	3.0	MINE,	0.0	0.1	RIVER NEAR SUOMI	0.01	1
r Oct		JAN(	RY TO	80			į	ENWOOL	7.2	0 01	[IONA]	8 2 2 2	0.80	ER NE	0 81	+
er yea	Sulfate (SO.)	MICHIC	I BUTA!	8.0	19	31	. 61	RIVER NEAR GREENWOOD	1.80	91 6	SAR NA	4.0.00	000	A RIV	8.0 10 8.2	
	Car ate	LAKE	ON TE	56		21 4	1 9	R NEA	38	- 00	EK NE	38 38	# C2	CANAE	8 2 2 2	
1110n	Bi- car- bon- ate (HCO <sub>3</sub> )	7 TO	STATI			101	101		4	21.01	H CRE	NAO	.,	ICH ES	4.00	
er mi	Lith- lum (Li)	BUTA	OWER					BLACK			BRANC		_	BRAN		
ts p	Po- tas- stum (K)	S TRI	ET (I					4-579.8.		P.	WEST	0.2		IDDLE		
in parts per million,	Sodium (Na)	STREAM	4-578,7. LAKE LORY OUTLET (LOWER STATION TRIBUTARY TO BLACK RIVER) NEAR REPUBLIC, MICH					4-57	2.0	: 1 1	4-580.2. WEST BRANCH CREEK NEAR NATIONAL MINE,	2.0		4-580.5. MIDDLE BRANCH ESCANABA		
lyses,	Mag- ne- sium (Mg)		NKE 1.01						2.9	911	4-1	1,3		4-5		1
Chemical analyses,	Cal- clum (Ca)		8.7. L						1 8.6	<u></u>		6.5				1
hemic	Man- ga- nese (Mn)		4-57	1.3	.57	0.	18		0.17	18		0.00	3.1		2.05	
O	Fe)						.61		1.5	. 62		1.6			0.42	
	Silica (SiO <sub>2</sub> )			13	4.0	4 1	7.8		0.6	. 14		15.5	: 1		5.8	1
	Discharge (cfs)			1.5			100		9.55			5.5	0		800 95 39	
				1961	1962	1963	Apr. 5		1961	Apr. 23, 1962 Nov. 14 Apr. 9, 1963.		July 19, 1961 Apr. 25, 1962 Nov. 14	1963.		Apr. 25, 1962 Nov. 14 Apr. 9, 1963 July 11.	
	Date of collection			y 20,	2.5	5.4	 0		y 19,			14 19,	y .		. 25, . 14, . 9,	
	l	l		Jul	Oct Apr	Nov	Apr		Jul Aug	API Nov Apr		Jul Nov	Jul Jul		Apr Apr Jul	

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	6.73	7.5		7.0	9.7.0	:		7.3	9 1	62 6.6		7.0	9.6	7.0		7.5	7.2	1	6.9	
	160 83 179	186		96 51	869			104	8 6	62		284	196	121		173	126	9 6	60	
	100	7.7		4	o 4 c			ì	٠ ر	7 4		1;	13	6		10	11	1	l w	
	142	94		52	17	14		1	15	25		13	30	. <del>1</del>		12	22	22	36	
	73	1 1		76	97			1	233	21		13	130	83		1 60	100	;		
	408	!!		4.0	0 0			4	7	۱ ۹		_	6 6	. m		2.3	7	!	!!	
	4.0	_	MICH.		0.1	'   		٥.				21	. a				-			
평.	50.00	50	ETON,		01.0	1		r.	0.0	0.0	MICH.	0.	2.0	.0.	<u>.</u>	0.4	0	1	۱۰.	
ON, MICH.	0	7 7	PRINC	0	0 H	1 .	•	0	-	1		6	<del>-</del> 1 α	വ	R, MICH	4 -	m		m ·	
BEAR CREEK NEAR PRINCETON,	4.9.6	7.2	MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON	7.6	111.0	CREEK NEAR DRINCETON		5.8	9.0	9.6	ELY CREEK NEAR NATIONAL MINE,	31	11	18	CREEK NEAR PALMER.	10	12	1	8.6	
NEAR	4	v) =#	3A RI			NEAL		•	_	0.40	SAR NA				SK NE	- m -	_	-		
CREEK	26 4 8	ži	SCANAL	2, 25	10 84 84	CBEE		25	<u> </u>	26	EEK NI	66	21	4		88	20	i	۱ m	
BEAR			NCH E			4-581 3 GREEN				_	LY CR	_		_	WARNER			_		
			S BRA		e:								_		-583.					
4-580.8.			MIDDE	1.2	e:	4-58					4-581,7.			,	4					
			4-581.	4.0	1.0	I			_					$\neg$						
				14	5.2															
	8.05 .05	4.		a,05	66;	?		0.05	8	38		0.70	20.5	38		0.07	13	1	10.	
	a0.13	. I			14.9	30.		1.0	82.	50		0.74	.16	.37		0.36				
	10 6.0			8.3	5.9	3		9.6	5.7	13			ທີ່ຄ			13	15		181	
	8 0 <del>4</del> 1	-			365	l		LC)		10		1.5	90	12		116	7.5	88	28.0	
	1961			1961	1962			1961	1962	1963		1961	1962	1963.		1961	:	963.		
	19, 1961 25, 1962 13	11.		19,	25, 1962	,		19,	#;	191		19,	25.	9, 15		19,	13	, 1	10:	
	July Apr. Nov.	Apr.		July Aug.	Apr.	whr.		July	Apr.	Apr.		July	Apr.	Apr. 9, 1		July	Nov	Apr.	Apr. 8	

a In solution when analyzed.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN -- Continued

		Per Tur- cent bid- satu ity ra tion			6 2		120		7		;	e. 4		7 2		4.			2.5	!]
	Dissolved oxygen	Per cent satu ra tion														83			1	-
	Diss	Parts per mil-	]													9.6			7.4 85	1
		Col-I			20		15		æ		35	140	75			72 6.8 24 66 6.3 75	100		49 6.6 35 40 6.2 50 53 7.0 100 87 8.3 65	1
	0.1	Hd			263 7.6 261 7.3		632 7.3 512 7.3		6.8		6.9	6.6	11	6.0		6.8	7.1		8.3	
	Specific conduct-	ance (micro- mhos at 25°C)							237		L		30						46 53 87	
	Hardness as CaCO,	Non- car- bon- ate			60		205		51							19			47.90	
ned		Cal- cium, mag- nesium			115 120		292 221		104				17			31			19 17 22 31	
Conti	Phos-Dissolved	solids (residue at 180°C)			185 177		427 348		148		15	4 9 2 29	1 !	1		61 63	93		41 40 40	
1963-	Phos-D	us as (PO4																		
ember	ž	trate (NO <sub>3</sub> )			8.0		3.0		0.5		0.4	1.0	1 1	1		4.0	9.		7.0	
Sept	; [i	ride (F)	ed	æ.	0.0	CH.		MICH.		<b>.</b>						0.1			0.2	1
, water year October 1962 to September 1963Continued		Chloride (C1)	STREAMS TRIBUTARY TO LAKE MICHIGAN Continued	4-583.37. GOOSE LAKE INLET NEAR PALMER, MICH	4.0	4-583.5. GOOSE LAKE INLET NEAR NEGAUNEE, MICH	21	4-584. GOOSE LAKE OUTLET NEAR SANDS STATION, MICH	5.5	4-621. PESHEKEE RIVER NEAR MICHIGAMME, MICH.	0.5	1.0		1,0	Е, МІСН.	1.0	3.0	JC, MICH.	2.0	
r October		Sulfate (SO <sub>4</sub> )	MICHIGAN-	NEAR PAI	69 69	NEAR NEG	204	R SANDS 3	50 34	R MICHIGA	9.0	8.8	1 1	5.2	RIVER AT MICHIGAMME,	9.2	7.8	AT REPUBLIC,	8008 8004	
yea	g.	S # S	AKE	INLET	(0.7	(LET )	200	r NEA	10.00	R NEA	10.				AT 1			VER	4	i
water	Bi-		2	AKE	66 64	IKE 13	107	OUTLE	65	RIVE	,	, 8		1 2	RIVE	33	8 7	4-623. MICHIGAMME RIVER AT	118 20 36	
ion,	<u> </u>		UTAR	OSE 1		SE I		AKE (		EKEE					SPURR			HIGA		1
mi11	Po-	tas- sium (K)	TRIE	7. 60	1.6	. 60	5.9	OSE 1	1.7	PESE						8.0		MIC.	0.4	
Chemical analyses, in parts per million,		Sodium (Na)	STREAMS	4-583.3	6.2	4-583,5	15	-584. GO	4.3	4-621.					4-662.2.	6.0		4-623	1.6	
d ut ,	Мав-				7.8		14 8.3	4	6.4							2.8			1.5	
alyses		cium (Ca)			33		94		31							6.3			5.2	
al an	Man-	ga- nese (Mn)			0.12						0.07	28	1 1	9.		0.11 .08	8.4		.00. 1.00.	
Chemic		Iron (Fe)			0.32		a0.09		a0.36		0.46	52.		.34		0.47	.21		20.05 .50 .28 .31	1
		mu (A1)																		
		Silica (SiO <sub>2</sub> )			20 7.0		5.8				9.0	7.5		4.6		6.5	6.5		39.04.3	
		Discharges (cfs) (g			8 4		10		25 8.9		115	1040	1270	430		120			393 1620 283 1560	
		of collection			Apr. 10, 1963 May 7		Nov. 7, 1961. May 7, 1963		Nov. 6, 1961. July 26, 1963		20, 1961	14	Apr. 5, 1963.	10		Aug. 24, 1961 Apr. 25, 1962	14, 1963		July 20, 1951 Apr. 26, 1962 Nov. 15 Apr. 9, 1963.	
		ū			Apr.		Nov.		Nov.		July	Apr.	Apr.	Apr.		Aug.	Apr.		July Apr. Nov.	,

8.0 0.5 0.8 125 7.5 44 120 1.0 .9 54 23 11 49 62 120 121 1.0 .9 97 47 6 104 7.4 120 11 1.0 29 10 65 6.4 65	Y TO LAKE ERIE	ER AT NEWVILLE, IND.	46     12       58     18       58     18         169     76       372     7.4	ER AT ST. MARYS, OHIO	40         16         351         7.3           80         43         2.5         420         273         62         679         7.6	ER AT DECATUR, IND.	499 292	581 1020	195 100	AT NEW HAVEN, IND.	125 38 299 82 760 7.7 17 17 17 17 17 17 17 17 17 17 17 17 17	ОНІО	721	70 19 1.5 391 303 56 625 7.9
70 150 150 150 150 150 150 150 150 150 15	STREAMS TRIBUTARY TO LAKE ERIE	4-1780. ST. JOSEPH RIVER AT NEWVILLE, IND.	314	4-1809.4. ST. MARYS RIVER AT ST. MARYS, OHIO	60 30 258	4-1815. ST. MARYS RIVER AT DECATUR, IND	252	-	116	4-1830. MAUMEE RIVER AT NEW HAVEN, IND.	264	4-1845. BEAN CREEK AT POWERS,		80 25 300
100 8.0 .59 .20 .059 .15							16.8	70			198		15	
July 20, 1961 Apr. 26, 1962 Nov. 15 Apr. 9, 1963.			Aug. 15, 1962 Mar. 21, 1963		Mar. 20, 1963 July 22		Oct. 11, 1962	Nov. 20 Feb. 14, 1963	Mar. 20		Aug. 15, 1962 Feb. 15, 1963		Feb. 15, 1963	Mar. 21

790-002 O - 65 - 25

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN -- Continued

		bity ity			L							_		20		65	
	Organics Dbe-Alky	nols ben- as zene C <sub>6</sub> H <sub>5</sub> sulfo- OH nate (ABS)			0.3	?		0.5	: 1		2.9	2:		0.0		0.2	1:
	Org	C. H						_	_								
	Bio-	Col-parts Per-Clemical of December 1 or Dec Satur demand 1 or 11 on tion (BOD)												3.3		1.8	0 I
	Dissolved oxygen	Per- cent satu- ra- tion									L			81 70		40	
70	Diss	Parts per mil- lion									L			10 7.8		27 3.8	3.7
tinue		10 Col				7.4			7.4		-	8.3		7.1 10		7.2 27	
Con		<u>~</u>							-		$\vdash$	$\neg$					$\neg$
1963-	Specific conduct-	ance (micro- mhos at 25°C)			778	648		848 389	516		2320	1510		571		563	613
ember	Hardness as CaCO3	Non- car- bon- ate				51			99		1	146	оню	116 118		111	104
Sept	Har as C	Cal- cium, mag- nesium				286			231		1	203	EDO,	254	OIH	232	248
r 1962 to	Phos-Dissolved		Continue	в, онго		385	з, онго		318	0110		754	E AT TOI	394	TOLEDO, C	364	i
ctobe	Phos-	ms (PO)	RIE	TRYKE			RSBUR			rown,			BRID	0.59	, AT	4.1	: 1
ear o	ž	trate (NO <sub>3</sub> )	AKE E	AT 8		3.5	BRUNE		11	ALLEN		1.0	WAYNE	8.7	OY 49	15	i
ter y	Ģ.	ride trate (F) (NO <sub>3</sub> )	2	RIVER			NEAR			R AT			HONY		AT BU		
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued		Chloride (CI)	STREAMS TRIBUTARY TO LAKE ERIE Continued	4-1850. TIFFIN RIVER AT STRYKER, OHIO		32	4-1855. TIPPIN RIVER NEAR BRUNERSBURG, OHIO		18	4-1875. OTTAWA RIVER AT ALLENTOWN, OHIO	11	99	4-1939.9. MAUMEE RIVER AT ANTHONY WAYNE BRIDGE AT TOLEDO,	32	4-1940.24. MAUMEE RIVER AT BUOY 49, AT TOLEDO, OHIO	33	34.
per mi		bon- Sulfate ate (804)	TREAMS	4-1850		62	5. TIPPI		62	875. OT	1:	317	MEE RIVE	112	4. MAUME	100	115
parts	Č,	g # g	"			9	1-185			4-1		12	. MAU		340.2		
u,	Bi-	bon- ate (HCO <sub>3</sub> )				286	•		202			414	939.9	168	4-16	148	176
lyses	<u> </u>												4-1				
l ana	Po-	tas- sium (K)															
Chemica		Sodium (Na)												21		25	3
	Mag-	ne- sium (Mg)				24			18			28					
	5	cium (Ca)				75			63			65					
		Discharge (cfs)			20			26			18						
	Š	of collection			Feb. 15, 1963	July 23		Feb. 15, 1963	July 23		Feb. 14, 1963	Mar. 19 July 22		May 29, 1963.		May 29, 1963.	May 29

	30		82		75		
	0.2		0.1		0.0		1.0
	2.4		£.4.		1.0		
	4 88 4 9		8 9 8 8 3 8 3 8 3 8 3 8 3 8 3 8 3 8 3 8	1	90		
	8.6.4 8.0.		8.5 8.7		7.5		
	112		∞		9		
	7.1		7.1		8.8		7.0
	555 582 593		372 388 412		385		733 1140 351
	104 113 115		48 58 66		58		92
, OHIO	228 242 246	оню	140 158 164	OHIO	160	01	154
TOLEDO	354	OLEDO,	242	LEDO,	222	AY, OH	512
8, AT	1:1	, AT 1	.35	AT TC	6.3 0.42	FIND	
SUOY 4	118	10Y 39	9.6	JOY 33	6.3	NEAR	
AT E		AT BU		AT BU		RIVE	
4-1940.26. MAUMEE RIVER AT BUOY 48, AT TOLEDO, OHIO	34 32 34	4-1940.5. MAUMEE RIVER AT BUOY 39, AT TOLEDO, OHIO	28 28 28	4-1940.6. MAUMEE RIVER AT BUOY 33 AT TOLEDO, OHIO	30	4-1980. BLANCHARD RIVER NEAR FINDLAY, OHIO	18
S. MAU	94 106 113	. MAUM	42 47 55	MAUM	48 44	980. B	20
940.2	77.7	940.5		940.6		4-1	
4-1	152 158 160	4-1	112 122 120	4-1	124 c125		96
	24 25		119		16		
							20
	33.		33.		.:		962
	9, 196		1, 196		, 196		20, 15
	May 29, 1963. May 29		Oct. 4, 1962. May 29, 1963. June 5		May 29, 1963. June 5,		Nov. 20, 1962 Feb. 14, 1963 Mar. 18

MISCELLANEOUS ANALYSES OF STREAMS IN ST. LAWRENCE RIVER BASIN -- Continued

		Tur- bidity
		ABS
		Color
		Hd
	Specific conduct-	ance (micro- mhos at 25°C)
per	Hardness sas CaCO,	Non- carbon- ate
ontin	Ha	Cal. ctum magn
. 1963C	Dissolved	solids (residue at 180°C)
ptember	Ä	trate (NO <sub>3</sub> )
2 to Se	ī	ride ride (F)
tober 196		Chloride (C1)
ar Oc		(SO,
ater ye		Sonate S
lion, w		bonate (HCO <sub>3</sub> )
er mil	P P	tas- sium (K)
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued		Calm Summ (Na) (RX) (RCO <sub>2</sub> ) (CO <sub>2</sub> ) (SO <sub>4</sub> ) (CC) (CC) (CC) (RX) (RX) (RCO <sub>2</sub> ) (CC) (CC) (CC) (CC) (RX) (RX) (RX) (RX) (RX) (RX) (RX) (RX
yses,	Mag-	Silica Iron ga- Cun ne- (SiO <sub>2</sub> ) (Fe) nese Cum sium (Mn) (Ca) (Mg)
al ana	3	ctum (Ca)
Chemic	Man-	ga- nese (Mn)
		Iron (Fe)
		Silica (SiO <sub>2</sub> )
		Discharge (cfs)
		Date of collection

STREAMS TRIBUTARY TO LAKE ERIE -- Continued

	8.0 6 0.0 0.4 7.8 5 .0 .4 8.1 5 .0 .3		7.7 4 0.0 0.4 7.9 4 .0 .5 8.0 4 .1 .0		7.8 5 0.0 0.8 7.9 4 .0 .8 7.8 4 .0 .3		7.7 5 0.0 0.3 7.6 6 .0 .4 7.4 3 .0 .6		7.6 4 0.0 0.4 7.9 4 .0 .4 7.6 3 .0 .5		7.3 7 0.0 0.6 6.9 4 .0 .0 7.1 6 .1 .6	
	259 288 288		278 288 295		302 311 339		194 215 336		296 299 339		330 423 462	
	26 27 19		26 19		32 33 35		23 25 25		37 29		57 44	
	128 144 136		128 141 138		146 148 160		88 100 158		137 146 159		151 168 177	
	156 166 165		162 172 170		180 184 206		114 123 201		177 174 201		193 233 287	
	1.536		5.6.2 2.4.8		5.7 2.9 1.9	Y.	0.1.9	, и.	4.8 1.8		7.9 11 6.9	
	777	Þ.	1.2.1.	RIDGE)	0.2	TO, N.	555	BROOK)	0.1	, N. Y	0.1	
CATTARAUGUS CREEK AT ARCADE, N. Y.	7.4 7.8 8.8	ARCADE, N.	8.8 9.7	Y. (ZOAR BRIDGE	7.7 8.0 10	4-2134.9. SOUTH BRANCH CATTARAUGUS CREEK NEAR OTTO, N.	6.1 6.8 9.0	CATTARAUGUS CREEK ABOVE GOWANDA (BELOW POINT PETER BROOK), N. Y.	7.8 7.3 7.4	4-2135. CATTARAUGUS CREEK AT GOWANDA (AT GAGE)	11 25 37	
ARCADE	20 20 17	NEAR	18 18 18	Α, Ν.	28 32	US CRE	20 24 24	LOW PO.	29 30 24	OWANDA	33 46 41	
CEK AT	000	CREEK	000	GOWAND	000	TARAUG	000	DA (BE	000	SK AT G	000	
SUS CRI	124 143 143	ARAUGUS	125 140 145	K NEAR	136 140 157	NCH CAT	80 97 163	GOWAN	122 135 159	US CREE	134 135 162	
TTARAU	0.1.1	. CATT	1.2	S CREE	1.2 1.3 1.6	TH BRA	1.3	K ABOVI	1.3	TARAUG	1.2	
ď	3.0 1.1	4-2134.1. CATTARAUGUS CREEK NEAR ARCADE,	4.1 3.9 6.0	CATTARAUGUS CREEK NEAR GOWANDA, N. Y.	3.8 5.0	34.9. SOU	8.8.4 8.9.9	UGUS CREE	4.1 3.7 5.0	2135. CAT	6.3 16 24	
	5.5 6.9		5.6 7.4 6.7		6.3 7.9 8.0	4-21	2.6 4.9 6.3	CATTARA	6.0 8.0 7.8	4-	6.2 8.4	
	244 645 84		244		48 46 51		31 32 53		45 45 51		50 52 57	
	0.00 .01		0.01 .01		0.01		0.00 .00 .01		0.02 .01		0.0 0.0 0.0 0.0	
	0.03 .02 .01		0.01 .03 .02		0.07		0.04		0.87 .04 .04		0.05	
	3.2		2,1.2		3.3		1.2		3.6 4.4 8.8		3.2	
	42 29 14.2		102 70 30.5		A500 307 110		25 19 2.83				539 370 135	
	Apr. 17. 1963. May 7.		Apr. 17, 1963. May 7.		Apr. 17, 1963. May 7		Apr. 17, 1963. May 7		Apr. 17, 1963. May 7		Apr. 17, 1963. May 7. July 5.	* vetimatec

May 7, 1963 34 96 2.00 101y 2 58 5.25 3.25 3.15 3.15 3.15 3.15 3.15 3.15 3.15 3.1	8.6	0.04	000		1	0	-	10	0	-		l								
7, 1963		.05	88.	52	9.5	12	2.6	148	0	43	14	0.1	1.38	169 228	122	48	387	7.3	ω <b>4</b>	0.0 0.6
7, 1963 2 8, 1963 5					4-2142	.4. EIGH	TEENMI	E CREEK	AT HI	GHLAND	4-2142.4. BIGHTEENMILE CREEK AT HIGHLAND-ON-THE-LAKE,	IKE, N.	Υ.							
	1.2	0.07	0.00	41 68	8.9	12	1.8	95 148	00	55 70	22 80	0.1	1.0	196 374	139	61 93	350 629	8.2	9 2	0.1 0.0
						BU	BUFFALO CREEK	REEK AT	JAVA	AT JAVA VILLAGE,	E, N. Y.									
	1.9	0.07	0.01	53	111	4.2	1.4	168 180	00	33	6.8	0.1	1.9	194	174	30	346 356	8.0	4.1	0.0 0.0
						4-2144.	BUFFA	BUFFALO CREEK NEAR WALES	NEAR	WALES	HOLLOW, N.	Υ.								
May 8, 1963 30 July 2 6.98	1.5	0.19	0.00	58	11	4.6	1.5	160 175	00	36	8.0	0.1 .1	1.9	200 226	170	39	358 393	8.1	4.0	0.0
							BUF	BUFFALO CREEK AT	EK AT	ELMA,	N. Y.									
May 8, 1963 58 July 5 25.5	4.4 4.4	0.05	0.00	51	14 8.6	6.5	1.6	162 145	00	53	10	0.1	1.7	216 227	185	52	380	7.7	4.0	0.0 0.0
						4-2145.	5. BUF	BUFFALO CREEK AT GARDENVILLE	EK AT	GARDEN	WILLE, N.	٧.								
May 8, 1963 118 July 5 21.3	3.9	0.04	0.01	50	14 8.7	3.9	3.1	160 136	00	37	13	0.1	2.5	204	183	52	383	7.6	20 80	0.0
						4-2150.		CAYUGA CREEK	K NEA!	NEAR LANCASTER,	ż	۲.								
May 8, 1963 28 July 5 6.00	3.9	0.03	0.01	54	13.8	6.2	3.1	149	00	43 52	13	0.1	1.4	205	174	52	370	8.1	8.0	0.0 0.0
					4-21	4-2152.5. WEST BRANCH CAZENOVIA CREEK	ST BRA	ICH CAZE	NOVIA	CREEK	NEAR EAST AURORA	AU ROR	1, N. Y.							
May 8, 1963 42 July 5 4.92	3.8	0.03	0.00	36	9.9	6.1	2.2	92	00	39	12	0.1	4.0	153	117	42 59	267 352	7.6	2 20	0.0 0.0
A Estimated.																				

# MISCELLANEOUS ANALYSES OF STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

	Tur- bidity			0.0		0.1			0.0		0.1		0.0		0.0		0.4	
	ABS			0.0		0.0			0.0		0.0		0.0		0.0		0.1	
	Color			6 2		201			4.0		2 2		4 9		4 8		ဖထ	
	Hď			7.8		0.8			8.1		8.2		8.1		7.9		7.5	
	Specific conduct- ance (micro- mhos at 25°C)			273 330		398 491			302		385		348 420		416		473 560	
	CO, Non- are			38		55			31 29		43		30		46 40		55	
ntinned	Hardness as CaCO, Cal- Not cium, carb magne- att			121 146		153 190			154		189 197		171		204		223 238	
1963Co	Hard Dissolved as Ca solids Cal- (residue cium, at 180°C) magne- sium			154 199		220 296			170 198		220 253		196 234		238 236		276 319	
tember	Ni- trate (NO <sub>3</sub> )		I. Y.	1.2		1.0			1.5		1.8 8.2		1.2		1.4		3.5	
to Ser	Fluo- ride (F)	Pa	ALES, N	0.1	۲.	0.1		N. Y.	0.1	Υ.	0.1	N. Y.	0.1	Y.	0.0	Υ.	2.2	
Chemical analyses, in parts per million, water year October 1962 to September 1963Continued	Chloride (C1)	STREAMS TRIBUTARY TO LAKE ERIEContinued	4-2153.5. EAST BRANCH CAZENOVIA CREEK AT SOUTH WALES, N.	1121	z	32 48	STREAMS TRIBUTARY TO NIAGARA RIVER	4-2164. TONAWANDA CREEK NEAR JOHNSONBURG, 1	5.8	TICA, N.	10	4-2165. LITTLE TONAWANDA CREEK AT LINDEN, N	6.8	4-2170. TONAWANDA CREEK AT BATAVIA, N. 1	13	TONAWANDA CREEK AT INDIAN FALLS, N.	37	
ar Oct	Car- bonate Sulfate (CO <sub>3</sub> ) (SO <sub>4</sub> )	E ERIE	REEK A	34 38	T EBEN	47 69	NIAGAR	R JOHN	26 27	NEAR A'	37 40	EEK AT	33	AT BAT	38	INDIAN	41	
ater ye	Car- bonate (CO <sub>3</sub> )	TO LAK	NOVIA C	00	CREEK A	0	ARY TO	SEK NEA	00	CREEK	00	NDA CR	00	CREEK	0	SEK AT	00	
ton. w	Bicar- bonate (HCO <sub>3</sub> )	BUTARY	H CAZE	100	4-2155. CAZENOVIA CREEK AT EBENEZER,	120	TRIBUT.	NDA CRI	150	TONAWANDA CREEK NEAR ATTICA,	178 188	TONAW	172 207	AWANDA	193 180	NDA CRI	205	
er mill	Pot- tas- sium (K)	AMS TRI	F BRANC	1.3	5. CAZE	3.50	FREAMS	TONAWA	1.0		1.7	LITTLE	1.3	70. TON	3.5	TONAWA	3.8	
parts p	Sodium (Na)	STRE	3.5. EAS	6.0	4-215	19 28	Ś	4-2164.	3.7	4-2164.6.	5.6	4-2165.	4.2	4-21	6.8	4-2174.	112 23	
vses, ti	Mag- ne- stum (Mg)		4-218	8.0		9.2			18 13		12 11		10 13		11		13 16	
l anal	Cal- clum (Ca)			36		46 58			32		56 61		52 59		62 57		89	
Chemica	Man- ga- nese (Mn)			0.00		0.00			0.01		0.02		0.00		0.01		0.01	
_	Iron (Fe)			0.05		0.11			0.06		0.09		0.14		0.19		0.13	
	Silica (SiO <sub>2</sub> )			1.9		3.9			5.2		5.2		3.1		4.2 2.3		1.2	
	Discharge (cfs)			5.34		81 10.4			17.4		50		9.9		73 21.4		86 27.0	
	Date of collection			May 8, 1963		May 8, 1963 July 2			May 8, 1963		May 8, 1963July 2		May 8, 1963 July 2		May 8, 1963 July 2		May 8, 1963 July 2	

4-2175. TONAWANDA CREEK NEAR ALABAMA, N. Y.

				, ,		ı	,
4.0		0.4		9 0.1 0.4 14 .7 .4		0.6	
6 0.1 12 .2		0.0		0.1		0.1	1
12		8 7		14		∞ ∞	
8,1 7.6		7.4		7.7		7.7	
562 670		675 950		507 763		626 1020	
88 93		141 253		63 78		112	1
257 282		321 455		230 261		272 486	-
333 410		437 650		302 472		384	
3.0		1.8		1.1		1.0	
0.2		0.2	. Y.	6.3	. ¥.	6,0	
31 46	4-2180. TONAWANDA CREEK AT RAPIDS, N. Y.	31 48	4-2184.5. ELLICOTT CREEK AT MILL GROVE, N. Y.	32	4-2185. ELLICOTT CREEK AT WILLIAMSVILLE, N. Y.	42 57	
73	AT RAP	134 240	T MILL	49 82	TILIAM	103	
00	CREEK	00	REEK	00	K AT	00	
205 232	AWANDA	219 247	TOOI,	204	TT CREE	196	
3.5	80. TON	1.7	.5. ELL	5.1	ELLICO	3.1	
29 29	4-21	12	4-2184	17 59	4-2185.	22	
14		16 22		11		14 18	
85		102 146		74		86 165	
0.01				0.03		0 0.14 0.02 86 14 5 .03 .02 165 18	
0.10 0.01		0.15 0.01		0.13 0.03 .06 .03		0,14	_
1.9 6.8		1.5		1.0		1.0	
99 34. 7		165 48.0		8.6 2.03		24	
May 8, 1963 July 2		May 8, 1963		May 8, 1963 July 5		May 8, 1963	

### MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN---Cont' nued

Periodic determinations of suspended-sediment discharge, water year October 1962 to

		ember 19		Suspen	ded sediment
Date	Time (24 hr)	Water tem- per- ature (°F)	Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)
STREA	MS TRIB	UTARY TO	LAKE SUPERIOR		
4-442	. CARP C	REEK AT	ISHPEMING, MIC	н.	
Apr. 25, 1962	0940		30	4	0.3
ov. 14	1000	1	8 18	2 24	T 1,2
		CDBEK NE	AR ISHPEMING,		
	1910	The state of the s	15	5	0,2
Apr. 24, 1962 Nov. 13	2000		5	1	1 T
Apr. 10, 1963	1120		12	5	.2
4-444.	CARP RI	VER NEAR	R NEGAUNEE, MIC	н.	
Aug. 24, 1961	1140		51	8	1.1
Apr. 25, 1962	0815 1030		85 30	12	2.8
Nov. 14	1200		24	9	.6
	We may-	UDADY CO	TAPE MICHICA	-	
			LAKE MICHIGAN		
4-578, MIDDLE I		SCANABA			т
Nov. 14, 1962	1820 0850		24 26	16 1	1.0
Dec. 12	1500		26 16	4	.1
ec. 27eb. 12, 1963	1700	\ \	8.8	i	T
lar. 13,	1615		6.3	1	T
pr. 4	1440		452	3	3.7
Apr. 5	1430		378	2	2.0
Apr. 9	1245		194	2	1.0
Apr. 9	1955 1700		158 64	2 6	1.0
May 8 June 13	1030		97	4	1.0
4-578.2. MIDDLE I	BRANCH E	SCANABA	RIVER NEAR GRE	ENWOOD, MICH	
Apr. 25, 1962	1605		450	3	3.6
Nov. 14	1730 1435		35 240	2 2	1.3
		RIVER NE	AR HUMBOLDT, M		
Aug. 24, 1961	1745	1	0.1	8	T
Apr. 26, 1962	1025		55	8	1.2
lov. 15	1005		7	3	T
pr. 9, 1963	1900		30	4	.3
		Y OUTLET	NEAR HUMBOLDT		
Oct. 12, 1962	0750 1515		0.5 1	2 3	T T
Dec. 10	1400	1	i	2	Ť
Peb. 13, 1963	0900		.3	2	T
dar. 13	1410		.2	1	Т
Apr. 5	1030		5	1	T
May 8	1535 0905		3 3	5 16	T 0.1
June 9	1050		3	10	.1
		KE OUTLE	T NEAR HUMBOLD	T, MICH.	
	1		1.5	12	Т
Oct. 12, 1962	0740	1			
lov. 6	1500		2	3	T
Oct. 12, 1962				3 3 15	T T 0.1

T Less than 0.05 ton.

### ST. LAWRENCE RIVER BASIN

### MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1962 to September 1963--Continued

		Water		Suspend	led sediment
Date	Time (24 hr)	tem- per- ature (°F)	Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)
STREAMS TR	IBUTARY	TO LAKE	MICHIGANCont	inued	
4-578.6. McKINNON	LAKE OU	TLET NE	EAR HUMBOLDT, MI	CHContinu	ed
Apr. 5, 1963	1045		6	4	0.1
Apr. 9	1935		3	4	T.
May 8	1355 1040		3 5	8 59	.1
July 9	0900		1	4	T
July 16	1920		.8	7	т
July 17	1230		1 1	8	Т
Aug. 6	1430	} ;	.3	19	T
Sept. 11	1140		.8	20	T
Sept. 24	1815		1	11	Т
4-578.7. L	AKE LORY	OUTLET	NEAR REPUBLIC,	MICH.	
Oct. 12, 1962	0800		3.5	14	0.1 T
Nov. 6	1525 0955		4.5	4	T
Dec. 10	0500		4	38	.4
Feb. 13, 1963	0900		2	3	T
Mar. 13	1400		1	1	т
Apr. 5	1010	, ,	20	i	.1
Apr. 9	1915		10	6	.2
May 8	1545	'	10	7	.2
June 13	1100	ŀ	12	15	.5
July 9	0930		2	4	T
July 16	1905 1300	1	1.8	4	T
July 17	1445		.3	17	T T
Sept. 11	1130		1.3	i	Ť
		REEK N	EAR NATIONAL MI		
		JABBE N		<del>,</del>	
Apr. 25, 1962 Nov. 14	1835 1555	[	60 10	2	0.3 T
Apr. 9, 1963	1615		30	2	T
		7004345	l		<del></del>
4-580.5. MIDDLE	,	SCANAB	A RIVER NEAR SU		
Aug. 23, 1961 Apr. 25, 1962	1830				
		1	45	5	0.6
Nov. 14	1140		800	10	22
Nov. 14.,	1140 1230 1210				
Nov. 14 Apr. 9, 1963	1230 1210	REEK NE	800 95	10 15 1	22 3.8
Nov. 14	1230 1210	REEK NE	800 95 450 AR PRINCETON, M	10 15 1 ICH.	22 3.8 1.2
Nov. 14. Apr. 9, 1963. 4-580.8 Apr. 25, 1962. Nov. 13.	1230 1210 . BEAR CI 1230 1630	REEK NE	800 95 450 AR PRINCETON, M: 40 13	10 15 1 ICH.	22 3.8 1.2
(ov. 14. 	1230 1210 BEAR CI 1230 1630 1140	REEK NE	800 95 450 AR PRINCETON, M: 40 13 25	10 15 1 ICH.	22 3.8 1.2
Nov. 14. Apr. 9, 1963.  4-580.8  Apr. 25, 1962.  Nov. 13. Apr. 9, 1963.  July 11.	1230 1210 BEAR CF 1230 1630 1140 0845		800 95 450 AR PRINCETON, M. 40 13 25 3.7	10 15 1 ICH.	22 3.8 1.2
Nov. 14. Apr. 9, 1963. 4-580.8 Apr. 25, 1962. Nov. 13. Apr. 9, 1963.	1230 1210 BEAR CF 1230 1630 1140 0845		800 95 450 AR PRINCETON, M. 40 13 25 3.7	10 15 1 ICH.	22 3.8 1.2
Apr. 9, 1963. 4-580.8  Apr. 25, 1962  Nov. 13  Apr. 9, 1963  July 11  4-581. MIDDLE Bi	1230 1210 . BEAR CI 1230 1630 1140 0845 RANCH ESC		800 95 450 AR PRINCETON, M. 40 13 25 3.7 RIVER NEAR PRINC	10 15 1 ICH.	22 3.8 1.2
A-580.8  4-580.8  A-580.8  Apr. 25, 1962.  Apr. 9, 1963.  August 11.  A-581. MIDDLE Billion 25, 1962.  Apr. 25, 1962.	1230 1210 . BEAR CI 1230 1630 1140 0845 RANCH ESC 1430 1430		800 95 450 AR PRINCETON, M. 40 13 25 3.7 RIVER NEAR PRINC 830 371	10 15 1 ICH. 1 2 4 1 1 CETON, MICH.	22 3.8 1.2 0.1 .1 .3 T
A-580.8  4-580.8  Apr. 25, 1962.  A-581. MIDDLE BI  Apr. 25, 1962.  A-581. MIDDLE BI  Apr. 25, 1962.  Apr. 9, 1963.	1230 1210 . BEAR CI 1230 1630 1140 0845 RANCH ESC 1430 1430 1100	CANABA	800 95 450 AR PRINCETON, M. 40 13 25 3.7 RIVER NEAR PRINC 830 371 472	10 15 1 ICH. 1 2 4 1 1 CETON, MICH.	22 3.8 1.2
A-580.8  4-580.8  Apr. 25, 1962.  A-580.8  Apr. 9, 1963.  A-581. MIDDLE BI  Apr. 25, 1962.  A-581. MIDDLE BI  Apr. 25, 1962.  A-581. MIDDLE BI  Apr. 25, 1963.  A-581.3.	1230 1210 . BEAR CI 1230 1630 1140 0845 RANCH ESC 1430 1430 1100 GREEN CF	CANABA	800 95 450 AR PRINCETON, M. 40 13 25 3.7 RIVER NEAR PRINC 830 371 472 AR PRINCETON, M.	10 15 1 ICH. 1 2 4 1 1 CETON, MICH.	22 3.8 1.2
Apr. 25, 1962	1230 1210 BEAR CI 1230 1630 1140 0845 RANCH ESC 1430 1430 1100 GREEN CF	CANABA	800 95 450 AR PRINCETON, M. 40 13 25 3.7 RIVER NEAR PRINC 830 371 472 AR PRINCETON, M.	10 15 1 1CH. 1 2 4 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1	22 3.8 1.2 0.1 .1 .3 T
Apr. 25, 1963.  4-580.8  Apr. 25, 1962.  Nov. 13. Apr. 9, 1963.  July 11.  4-581. MIDDLE Bl  Apr. 25, 1962.  Nov. 13.  Apr. 9, 1963.  4-581.3.  Apr. 24, 1962.  Nov. 13.	1230 1210 BEAR CI 1230 1630 1140 0845 RANCH ESC 1430 1100 GREEN CF	CANABA	800 95 450 AR PRINCETON, M. 40 13 25 3.7 RIVER NEAR PRINC 830 371 472 AR PRINCETON, M. 45	10 15 1 ICH.  1 2 4 1 1 CETON, MICH.  2 1 1 1 CCH.	22 3.8 1.2 0.1 .1 .3 T
Apr. 25, 1962. Apr. 25, 1962. Apr. 9, 1963. Apr. 9, 1963. Apr. 9, 1963. Apr. 25, 1962. Apr. 9, 1963. Apr. 25, 1962. Apr. 9, 1963. Apr. 24, 1962. Apr. 24, 1962. Apr. 13, 1962. Apr. 10, 1963.	1230 1210 BEAR CI 1230 1630 1140 0845 1430 1430 1430 1430 1650 1650 1645 1350	CANABA REEK NE	800 95 450 AR PRINCETON, M. 40 13 25 3.7 RIVER NEAR PRINC 830 371 472 AR PRINCETON, M. 45 9	10 15 1 ICH.  1 2 4 1 1 CETON, MICH.  2 1 1 1 CCH.	22 3.8 1.2 0.1 .1 .3 T
Apr. 25, 1962. Apr. 25, 1963. A-580.8 Apr. 25, 1962. Apr. 9, 1963. Aulty 11. A-581. MIDDLE Bl Apr. 25, 1962. Apr. 9, 1963. Apr. 9, 1963. Apr. 9, 1963. Apr. 24, 1962. Apr. 24, 1962. Apr. 10, 1963. Apr. 10, 1963. Apr. 10, 1963. Apr. 10, 1963.	1230 1210 BEAR CI 1230 1630 1140 0845 RANCH ESC 1430 1100 GREEN CF 1650 1645 1350	CANABA REEK NE	800 95 450 AR PRINCETON, M. 40 13 3.7 RIVER NEAR PRINCE 830 371 472 AR PRINCETON, M. 45 9 10	10 15 1 ICH.  1 2 4 1 1 CETON, MICH.  2 1 1 ICH.	22 3.8 1.2 0.1 .1 .3 T
Apr. 25, 1962. Apr. 25, 1962. Apr. 9, 1963. Apr. 9, 1963. Apr. 9, 1963. Apr. 25, 1962. Apr. 9, 1963. Apr. 25, 1962. Apr. 9, 1963. Apr. 24, 1962. Apr. 24, 1962. Apr. 13, 1962. Apr. 10, 1963.	1230 1210 BEAR CI 1230 1630 1140 0845 1430 1430 1430 1430 1650 1650 1645 1350	CANABA REEK NE	800 95 450 AR PRINCETON, M. 40 13 25 3.7 RIVER NEAR PRINC 830 371 472 AR PRINCETON, M. 45 9	10 15 1 ICH.  1 2 4 1 1 CETON, MICH.  2 1 1 1 CCH.	22 3.8 1.2 0.1 .1 .3 T

### MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1962 to September 1963--Continued

	Septem	I I	33continued		
		Water		Suspend	led sediment
Date	Time (24 h <b>r)</b>	tem- per- ature (°F)	Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)
STREAMS TR	IBUTARY	TO LAK	E LAKE MICHIGAN-	-Continued	
4-583.	WARNER	CREEK	NEAR PALMER, MIC	н.	
Nov. 13, 1962	1715	]	7.5	2	T
Apr. 5, 1963	1545 1300	1	83 28	8 6	1.8
		RUTARY	TO LAKE ERIE		L
			NEAR NEWVILLE,	IND.	
Apr. 5, 1952	1545		1150	150	46€
Anr 7	0955		1820	86	423
Apr. 8. Apr. 14.	1005		1860	53	26€
Apr. 14	0835		1900	255	1310
Apr. 15	0955		2300	178	1110
Apr. 16	1035		2700	151	1100
Apr. 18	1020	1	2300	60	373
Apr. 24	1105		770	57	119
May 24	1540		1620	419	1830
May 25	1010			336	
fav 26	1015			130	
May 26	1935		2300	115	714
May 27	1045		2150	105	610
May 28	0840		2050	80	443
May 29	1020		2350	43	273
Mar. 21, 1963	0930	L		31	
	ST. MARY	S RIVE	R AT DECATUR, IN		
Oct. 11, 1962	1440			26	
Nov. 20	0840 1430	İ		28 139	
		RIVER	AT ANTWERP, OHIO		
Apr. 5, 1952	1640		4210	384	436C
Apr. 7	1055	İ	5280	176	2510
Apr. 8	1105		4450	110	1320
Apr. 14	0915	i	6080	194	3180
Apr. 15	1045	ļ	7830	341	7210
Apr. 16	1120	i	5680	227	3480
Apr. 18	1115	ì	5380	155	2250
Apr. 24	1155	1	7170	276	5340
May 24	1620	1	6510	576	10100
May 25	1105	1	11800	712	22700
May 26	1115	1	12300	357	11900
May 27	1130		9620	290	7530
ay 28	0950	1	7280	168	3300
May 29	1120 1745		5280 5160	140 110	2000 1530
	1140	اــــــا	0100	110	1
	BE 437 -		m normana arra-		
4-1845	T	REEK A	T POWERS, OHIO		1
4-1845 July 18, 1963	1515		20	9	0.5
4-1845 July 18, 19634-1850.	1515 TIFFIN		20 AT STRYKER, OHIO		
4-1845 July 18, 19634-1850. Apr. 5, 1952	1515 TIFFIN		20 AT STRYKER, OHIO	387	805
4-1845  July 18, 1963	1515 TIFFIN 0925 0850		20 AT STRYKER, OHIO 770 1390	387 115	805 432
4-1845 (uly 18, 1963	1515 TIFFIN 0925 0850 0900		20 AT STRYKER, OHIO 770 1390 1420	387 115 62	805 432 238
4-1845 (uly 18, 1963	1515 TIFFIN 0925 0850 0900 1045		20 AT STRYKER, OHIO 770 1390 1420 1220	387 115 62 284	805 432 238 935
4-1845  July 18, 1963	1515 TIFFIN 0925 0850 0900 1045 0840		20 AT STRYKER, OHIO 770 1390 1420 1220 1780	387 115 62 284 235	805 432 238 935 1130
4-1845  July 18, 1963	1515 TIFFIN 0925 0850 0900 1045		20 AT STRYKER, OHIO 770 1390 1420 1220	387 115 62 284	805 432 238 935
4-1845  July 18, 1963	1515 TIFFIN 0925 0850 0900 1045 0840 0915 0915		20 AT STRYKER, OHIO 770 1390 1420 1220 1780 1880 1360	387 115 62 284 235 143 74	805 432 238 935 1130 726 272
4-1845 July 18, 1963  4-1850,  Apr. 5, 1952  Apr. 7  Apr. 8  Apr. 14  Apr. 15  Apr. 16  Apr. 16  Apr. 18  Apr. 18  Apr. 19	1515 TIFFIN  0925 0850 0900 1045 0840 0915 0915		20 AT STRYKER, OHIO 770 1390 1420 1220 1780 1880 1360	387 115 62 284 235 143 74	805 432 238 935 1130 726 272
4-1845 July 18, 1963.  4-1850.  Apr. 5, 1952.  Apr. 7.  Apr. 8.  Apr. 14.  Apr. 15.  Apr. 16.  Apr. 18.  Apr. 24.  Aday 24.	1515 TIFFIN 0925 0850 0900 1045 0840 0915 0915		20 AT STRYKER, OHIC 770 1390 1420 1220 1780 1880 1360 584 313	387 115 62 284 235 143 74 98	805 432 238 935 1130 726 272 155
4-1845 July 18, 1963	1515 TIFFIN 0925 0850 0900 1045 0840 0915 0915 1000 1440 1755		20 AT STRYKER, OHIO 770 1390 1420 1220 1780 1880 1360 584 313 917	387 115 62 284 235 143 74 98 86 286	805 432 238 935 1130 726 272 155 73 709
4-1845 July 18, 1963.  4-1850.  Apr. 5, 1952.  Apr. 7  Apr. 8  Apr. 14  Apr. 15  Apr. 16  Apr. 18  Apr. 24  Aay 24  Aay 25  Aay 25  Aay 26	1515 TIFFIN 0925 0850 0900 1045 0840 0915 0915 1000 1440 1755 0915		20 AT STRYKER, OHIC 770 1390 1420 1220 1780 1880 1360 584 313	387 115 62 284 235 143 74 98	805 432 238 935 1130 726 272 155 73 709 536
4-1845 July 18, 1963.  4-1850,  Apr. 5, 1952,  Apr. 7,  Apr. 8.  Apr. 14,  Apr. 15,  Apr. 16,  Apr. 16,  Apr. 18.  Apr. 18.  Apr. 18.  Apr. 24,  May 24,  May 25,  May 26,  May 26,  May 26,  May 27,	1515 TIFFIN 0925 0850 0900 1045 0840 0915 0915 1000 1440 1755 0915		20 AT STRYKER, OHIC  770 1390 1420 1220 1780 1880 1360 584 313 917 1050 1300	387 115 62 284 235 143 74 98 86 286 189 94	805 432 238 935 1130 726 272 155 73 709
4-1845  July 18, 1963.  4-1850.  Apr. 5, 1952.  Apr. 7  Apr. 8  Apr. 14  Apr. 15  Apr. 16  Apr. 18  Apr. 18  Apr. 18  Apr. 24  May 24  May 25  May 26	1515 TIFFIN 0925 0850 0900 1045 0840 0915 0915 1000 1440 1755 0915		20 AT STRYKER, OHIO 770 1390 1420 1220 1780 1880 1360 584 313 917 1050	387 115 62 284 235 143 74 98 86 286 189	805 432 236 935 1130 726 272 155 73 709 536 330

T Less than 0.05 ton.

### ST. LAWRENCE RIVER BASIN

### MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1962 to September 1963--Continued

	eptember	1963-	-Continued		
		Water		Suspen	ded sediment
Date	Time (24 hr) tem-per-ature (°F)		Discharge (cfs)	Mean concen- tration (ppm)	Discharge (tons per day)
STREAMS T	RIBUTARY	TO LA	KE ERIEContinu	ed	•
			NEAR FINDALY, OH		
Nov. 20, 1962	1450		79	14	2.9
4-1915. A	UGLAIZE	RIVER	NEAR DEFIANCE, O	ніо	
Mar. 27, 1952	1615		2960	165	1320
pr. 5	1750	1	2460	107	711
pr. 7	1230		6280	143	2420
pr. 14	1245	j l	5470	257	3800
pr. 15	1200	!	7980	244	5260
pr. 16	1230		6790	188	3450
pr. 17	2135		5470	141	2080
pr. 18	1225		4230	109	1240
Apr. 24	1320		4990	129	1740
lay 24	1710		3220	109	948
fay 25	1550	i	8880	717	17200
lay 26	1245	.	8700	400	9400
lay 27	1310		7470	275	5550
lay 28	1100		6450	205	3570
lay 29	1235		3640	178	1750
Mar. 19, 1963	0930		5100	96	1320
4-1925,	MAUMEE R	IVER N	EAR DEFIANCE, OH	10	
Mar. 21, 1952	1425		16900	318	14500
pr. 5	1915		9750	479	12600
pr. 7	1605		15700	191	8100
pr. 14	1525		16500	284	12700
pr. 15	1335		18900	267	13600
pr. 16	1355	1	17700	259	12400
ipr. 18	1355		11600	146	4570
pr. 24	1420		10000	174	4700
lay 24	1810		10000	289	7800
lay 25	1655	l i	24600	930	61800
lay 26	1340		23700	520	33300
ay 27	1405		19800	276	14800
lay 28	1245		16500	244	10900
lay 29	1335		11000	170	5050
lov. 20, 1962	1120		325	8	7
dar. 18, 1963	1600		14300	133	5140

A	Page	l	Page
Acidity	18-19	Canton, N. C. Pigeon River at Cataloochee Creek near	252
River at	368 36-37 34-35	Cataloochee, N.C	254-255 130-132
at Warren, Pa	40-41 138-141	celo, N.C., South Toe River near Charleroi, Pa., Monongahela River at	257-258 50-51
AluminumArthur, Tenn., Powell River near	10 264	Charleston, W. Va., Kanawha River at Cheat River at Lake Lynn, Pa	117 49
Ashville, N.C., French Broad River	248	Chemical quality	4 142 13
Athens, Ohio, Hocking River at  Au Sable River, at Grayling, Mich  at Mio, Mich	97-104 329 330	Chloride Chromium Clay, W. Va., Elk River at	15 15
Aurora, Minn., Partridge River near. St. Louis River near	297-298 299	Clinch River above Tazewell, Tenn Clinton River near Drayton Plains,	263
Second Creek nearB	295-296	Mich. (tributary to Lake St. Clair) Collection and examination of	337
Baldwinsville, N.Y., Seneca River at	365	samples	3-6 20
Barbourville, Ky., Cumberland River at	241 17	Columbus, Ohio, Alum Creek at Composition of surface waters Connellsville, Pa., Youghiogheny	138-141 9-24
Barren River at Bowling Green, Ky near Finney, Ky	216-217 215	River at	53 27-31
Bear Creek near Oak Ridge, Tenn Beaver Falls, Pa., Beaver River at	267 60-61	Comperiand River, at Barbourville,	15-16 241
Beaver River at Beaver Falls, Pa Beaver River at Moshier Falls, N.Y Beaver River basin	60-61 366 56-61	at Smithland, Ky	244
Bent Creek, N.C., French Broad River at Bessemer, Mich., Black River near	247	Ky Cumberland River basin 241-244	243 293, 294,
Bessemer, Mich., Black River near Beverly, Ohio, Muskingum River near. Bicarbonate, carbonate and hydroxide	30 2 94-95 12	Cuyahoga River at Independence, Ohio	356-359
Big Sandy River at Catlettsburg, Ky. Big Sandy River basin	130-132	River at	163
Black River at Elyria, Ohio (tributary to Lake Erie)		D .	100 171
Black River at Watertown, N. Y. (tributary to Lake Ontario) Black River near Bessemer, Mich.	367	Dayton, Ohio, Mad River near Dillon Falls, Ohio, Licking River near	169-171
(tributary to Lake Superior) near Garnet, Mich. (tributary to	302	Dillsboro, N.C., Tuckasegee River at Dissolved solids	260 14-15
Lake Michigan)near Republic, Mich. (tributary to Lake Michigan)	303 304-307	Division of work	31 259
Blantyre, N.C., French Broad River	246	Dresden, Ohio, Muskingum River at	337 80-83
Bluestone Dam, W. Va., New River at. Boardman River near Mayfield, Mich	109 326 14	Duck River above Hurricane Mills, Tenn near Shelbyville, Tenn	275 274
Boston, Ky., Rolling Fork near Bowling Green, Ky., Barren River at.	202	Dundee, Ky., Rough River at	221
Bryson City, N.C., Tuckaseegee	17	E Eagle Creek at Glencoe, Ky	197_201
River at	261 276	East Branch Au Gres River at McIvor,	331
near	243 336	East Branch Escanaba River at Gwinn, Mich	314-317
С		East Branch Pine River near Tustin, Mich	322
Cabin Creek, W. Va., Kanawha River	112	East Fork Poplar Creek near Oak Ridge, Tenn East Fork White River at Seymour,	266
Calcium	11 79	Ind East Liverpool, Ohio, Ohio River at.	230 62-63
Cane Branch near Parkers Lake, Ky	242	Elizabethton, Tenn., Doe River at 387	259

388	Page		Page
Elizabethtown, Ohio, Great Miami		Higby, Ohio, Scioto River at	143-146
River at	180-182	Hocking River at Athens, Ohio	97-104
River at.  Elk River above Fayetteville, Tenn.  Elk River at Estill Springs, Tenn  near Prospect, Tenn.	272	Hocking River basin	97-104
Elk River at Estill Springs, Tenn	271	Hot Springs, N.C., French Broad	
near Prospect, Tenn	273	River at	251
Elk River, at Clay, W. Va	115	Houghton Creek near Lupton, Mich	332
at Queen Shoals, W. Va	116	Hoxevville, Mich., Pine River near	324
at Sutton, W. Va	113	Huntington, W. Va., Ohio River near. Huron River at Milan. Ohio	122
near Frametown, W. Va	114	Huron River at Milan. Ohio	352
Elkhorn City, Ky., Russell Fork at Elkins, W. Va., Tygart River at Elyria, Ohio, Black River at	123	Hurricane Mills, Tenn., Duck River	275
Fluria Ohio Black Divor of	252_255	above Hyde, Mich., Ford River near	318
		Hydrogen-ion concentration	20
Englewood, Ohio, Stillwater River at Estill Springs, Tenn., Elk River at.	166-168	nydrogen-ion concentration	20
Estill Springs, Tenn., Elk River at.	271	Ĭ	
Evart, Mich., Muskegon River at Expression of results	320		
Expression of results	6-9	Independence, Ohio, Cuyahoga River	
		at	356-359
F	-	Introduction	1-3
7-13 0 0 W Db D1		Iodide	17
Falls of Rough, Ky., Rough River	010 000	Iron	10
near	150 154	Ishpeming, Mich., Middle Branch	208-210
Favetteville Tenn Elk River above	272	Escanaba River near	300-310
Finney Ky. Rarren River near	215	J	
Fluoride	13	Ÿ	
Fluoride	318	Johns Creek near Van Lear, Ky	124
Foster City, Mich., Sturgeon River			_
		K	
near Va. Elk River near. Frametown, W Va. Elk River near. Frankfort, Ky., Kentucky River at., Freesoil, Mich., Little Manistee River near Fremont, Ohio, Sandusky River near.	319		
Frametown, W. Va., Elk River near	114	Kanawha River, at Cabin Creek,	
Frankfort, Ky., Kentucky River at	190-196	w. Va. at Charleston, w. Va. at Kanawha Falls, w. Va. at Winfield Dam, at Winfield,	112 117
Pivon noon	225	at Charleston, W. Va	111
Framont Ohio Sanducky Diver near	349_351	at Kanawna Fails, w. va	111
French Broad River, at Ashville,	545-551	W. Va	118-121
N.C	248	Kanawha River basin 108	-121.286
at Bent Creek, N.C	247	Kanawha River basin 108- Kentucky River at lock 4, at	
at Blantvre, N.C	246	Frankfort, Ky	190-196
at Hot Springs, N.Cat Marshall, N.C	251	Frankfort, Ky	186-201
at Marshall, N.C	249-250	Kermit, W. Va., Tug Fork at Killbuck Creek at Killbuck, Ohio	125
at Rosman, N.C	245	Killbuck Creek at Killbuck, Ohio	75-78
Friendsville, Md., Youghiogheny	52	Kiskiminetas River at Leechburg (Vandergrift), Pa Kiskiminetas River basin	38-39
River at	52	(Vandergriit), Pa	38-39
G		Wittenning De Allegheny Diver et	36-37
		Kittanning, Pa., Allegheny River at. Knapp Creek at Marlinton, W. Va	110
Garnet, Mich., Black River near Genessee River at Driving Park Avenue, Rochester h. Y	303	Kyrock, Ky., Nolin River at	214
Genessee River at Driving Park		.,, .,,,,	
Avenue, Rochester N. Y	364	L	
	197-201		
Glenlyn, Va., New River at	108	Lafayette, Ind., Wabash River at Lake Lynn, Pa., Cheat River at Le Roy, Mich., Pine River near	223
Glenville, w. va., Little Kanawna	~	Lake Lynn, Pa., Cheat River at	49 323
Gnand Chain III Ohio Piver near	278_280	Le Roy, Mich., Pine River hear	16
Grand River at Painesville Ohio	360-363	Leavittsburg, Ohio, Mahoning River	-
Gravling, Mich., Au Sable River at.,	329	at	56
Grayling, Mich., Au Sable River at Manistee River near	321	Leechburg, Pa., Kiskiminetas River	
Great Miami River, at Elizabethtown,	-	at Levisa Fork at Paintsville, Ky	38-39
Ohio	180-182	Levisa Fork at Paintsville, Ky	125-128
at Hamilton, Ohio	178	Licking River at Farmers, Kv	150-154
at Miamisburg, Ohioat Middletown, Ohio	172 176	at McKinneysburg, KyLicking River below Dillon Dam, near	199-162
near Hamilton, Ohio	179	Dillon Falls, Ohio	86
near Miamisburg Ohio	173-175	near Newark Ohio	84-85
near Miamisburg, Ohio near Middletown, Ohio	177	near Newark, OhioLicking River basin	150-163
near Taylorsville Dam, at	1	Literature cited	31-33
Taylorsville, Ohio	164-165	Lithium	12
Great Miami River basin. 164-182,291	-292,294	Little Barren River near Monroe, Ky.	204
Green River, at Greensburg, Ky	203	Little Kanawha River at Glenville,	
at lock 4, at Woodbury, Ky	218	W. Va	96
at Mammoth Cave, Ky	212-213	Little Manistee River near	200
Green River basin 203-222	202-211	Freesoil, Mich	325
Greensburg, Ky., Green River at	203	Little Tennessee River at McGhee,	262
Greenup. Kv Tygarts Creek near	133-136	Lobelville, Tenn., Buffalo River	202
Greenup, Ky., Tygarts Creek near Gwinn, Mich., East Branch Escanaba	_55 250	near	276
River at	314-317	Lowellville, Ohio, Mahoning River	
	l	at	57-59
н	ļ	at Lucasville, Ohio, Scioto River at	147-149
Hamilton Objects to the Co.		Lupton, Mich., Houghton Creek near Rifle River near	33 2 33 3
Hamilton, Ohio, Great Miami River at	178 179	Kille River near	333
Great Miami River near	17-18	w	
Hazard, Ky., North Fork Kentucky	-1-10	III.	
River at	186-189	McConnelsville, Ohio, Muskingum	
			87-93

	rage	1	Page
McGhee, Tenn., Little Tennessee		Ohio River near lock and dam 53,	
River at	262	near Grand Chain, Ill	278-280
McIvor, Mich., East Branch Au Gres		Ohio River basin	34-29
River at	331	miscellaneous analyses of streams	001 00
McKinneysburg, Ky., Licking River at Mad River near Dayton, Ohio	169-171	in	281-294
Magnesium	11	Ohio	137
Mahoning River at Leavittsburg, Ohio	56	Olney, Ky., Tradewater River at	234-240
at Lowellville, Ohio	57-59	Organics	21
Mammoth Cave, Ky., Green River at	10-11	Oxygen consumed	21
Manganese	321	р	
Marlinton, W. Va., Knapp Creek at	110	-	
Marlinton, W. Va., Knapp Creek at Marshall, N.C., French Broad River		Painesville, Chio, Grand River at Paintsville, Ky., Levisa Fork at	360-363
at Maumee River, at buoy 31, at Toledo,	249-250	Paintsville, Ky., Levisa Fork at	125-128
Obio	348		242
Ohioat Center of C and O Railroad	010	Parsons W.Va. Shavers Fork at	47-48
dock, at Toledo, Ohio	346-347	Parkers Lake, Ky., Cane Branch near. Parsons, W.Va., Shavers Fork at Partridge River near Aurora, Minn	297-298
at Craig Bridge, at Toledo, Ohio at Toledo Overseas Terminal Dock,	342-343	Phosphate	14 25
at Toledo Overseas Terminal Dock,		Pigeon River, at Canton, N.C	25
at Toledo, Ohio	344-345	at Waterville, N.C	256 253
at waterville, Ohio	326	near Hepco, N.C	328
Metropolis, Ill., Ohio River at	277	Pine River near Hoxeyville, Mich	324
Metropolis, Ill., Ohio River at Miamisburg, Ohio, Great Miami River	-	near Le Roy, Mich	3 23
at	172	near Le Roy, Mich Point Marion, Pa., Monongahela River	
Great Miami River near	173-175	at Pond River near Sacramento, Ky	43-46
Middle Branch Escanaba River near Ishpeming, Mich	308-310	Pond River near Sacramento, Ky Poplar Creek near Oak Ridge, Tenn	222 263
Middletown, Ohio, Great Miami River	555 515	Powell River near Arthur Tenn	264
at.,	176	Powell River near Arthur, Tenn Prior Creek near Selkırk, Mich	334
Great Miami River near	177	Properties and characteristics of	
Milan, Ohio, Huron River at	352 10-17	water	17-24 273
Mineral constituents in solution Mio, Mich., Au Sable River at	330	Prospect, Tenn., Elk River near	26 - 27
Miscellaneous analyses of streams in	555	Publications	20-2
Ohio River basin	281 - 294	Q.	
St. Lawrence River basin	369-385	·	
Monongahela River at Charleroi, Pa	50-51	Queen Shoals, W.Va., Elk River near.	116
at lock and dam 8, at Point Marion, Pa	43-46	R	
Monongahela River		<del>-</del>	
basin	, 290-291	Ravenswood, W.Va., Ohio River at Republic, Mich., Black River near Rifle River at Selkirk, Mich	105~10
Monroe, Ky., Little Barren River	904	Republic, Mich., Black River near	304-307
near. Moshier Falls, N.Y., Beaver River at Munfordville, Ky., Green River at Muskegon River at Evart, Mich	366		335 335
Munfordville, Kv., Green River at	205-211	Riverton, Ind., Wabash River at Rochester, N. Y., Genessee River at. Rolling Fork near Boston, Ky	226
Muskegon River at Evart, Mich	320	Rochester, N. Y., Genessee River at.	364
		Rolling Fork near Boston, Ky	202
at McConnelsville, Ohio	87-93 94-95	Rosman, N.C., French Broad River at. Rough River at Dundee, Ky	245
near Beverly, Ohio	68-95	at Rough River Dam, near Falls of	221
wanting and introduced and interest to the control of the control		Rough, Ky	219-220
N		Rough, Ky	123
Now Haven Ill Wabach Divon non	921 - 922	s	
New Haven, Ill., Wabash River near New River at Bluestone Dam, W.Va	109	8	
at Glenlyn, Va	108	Sacramento, Ky., Pond River near	222
at Glenlyn, Va Newark, Ohio, Licking River near	84-85	St. Lawrence River, at Alexandria	
Newcomerstown, Ohio, Tuscarawas	68-74	Bay, N.Y	368
River at	15	St. Lawrence River basin	295-385
Nitrate	13-14	miscellaneous analyses of streams	369-385
Noblesville, Ind., White River at	228	St. Louis River at Scanlon, Mirn	301
White River near	227	near Aurora, Minn	299
Nolin River at Kyrock, Ky	214	Salt Fork at mouth, near Cambridge,	
Nora, Ind., White River near North Fork Kentucky River at Hazard,	229	Ohio	79 349-351
Ky	186-189	Sandusky River near Fremont, Orio Scanlon, Minn., St. Louis River at	301
-,		Schweitzer Creek near Palmer, Nich	311-313
0		Scioto River, at Chillicothe, Chio	142
Oak Bidaa Maaa Baaa Gaaak aan	267	at Higby, Ohio	143-146
Oak Ridge, Tenn., Bear Creek near East Fork Poplar Creek near	266	at Lucasville, Ohio	197-149
Poplar Creek near	265	Scioto River basin	295-296
Poplar Creek nearOakmont, Pa., Allegheny River at	40-41	Sediment	6,23-24
Ohio River, at East Liverpool, Ohio.	62-63	Sediment	334
at New Cumherland Dam, at	64.67	Rifle River at	333
Stratton, Ohioat lock and dam 22, at Ravenswood,	64-67	Seneca River at Baldwinsville, N.Y	365
W.Va	105-107	Sequatchie River near Whitwell,	270
at Markland Dam, near Warsaw, Ky	183-185	Sevmour, Ind., East Fork White	
at Metropolis, Ill	277	River at	230
at South Heights, Pa	54-55 122	Shavers Fork at Parsons, W.Va Shelbyville Tenn. Duck River near.	47-48

Page		Page
Shiawassee River at Byron, Mich 336	Turbidity	23
Silica	Tuscarawas River at Newcomerstown.	20
Smithland, Ky., Cumberland River at. 244	Ohio	68-74
Sodium-adsorption-ratio	Tustin, Mich., East Branch Pine	
Sodium and potassium	River near	322
South Fork Licking River at	Tygart River at Elkins, W. Va	42
Cynthiana, Ky	Tygarts Creek near Greenup, Ky	133-136
South Heights, Pa., Ohio River at 54-55	Tygarts Creek basin	133-136
South Toe River near Celo, N.C 257-258		
Specific conductance	v	
Stillwater River at Englewood, Ohio. 166-168		
Stratton, Ohio, Ohio River at 64-67 Streamflow 24-25	Valley River at Tomotla, N.C	238-269
	Van Lear, Ky., Johns Creek near	124
Streams tributary to, Lake Erie 338-363,375-380,384-385	Vanderbilt, Mich., Pigeon River	328
Lake Huron 327-336	near	328
Lake Michigan 303-326,370-375,382-384	w	
Lake Ontario	"	
Lake Superior 295-302,369-370,382	Wabash River, at Lafayette, Ind	223
Niagara River	at Riverton, Ind	226
Strontium	near New Haven, Ill	231-233
Sturgeon River near Foster City,	near Sullivan, Ind	224-225
Mich	Wabash River basin	223-233
near Wolverine, Mich. (tributary	Warren, Pa., Allegheny River at	34-35
to Lake Huron)	Warsaw, Ky., Ohio River at	183-185
Sulphate	Watertown, N. Y., Black River at	367
Sullivan, In., Wabash River near 224-225	Waterville, N.C., Pigeon River at	256
Sutton, W.Va., Elk River at 113	Waterville, Ohio, Maumee River	
	at	338-341
T	White River at Noblesville, Ind	228
	near Noblesville, Ind	227
Taylorsville, Ohio, Grear Miami	near Nora, Ind	229
River at	Whitwell, Tenn., Sequatchie River	070
Tazewell, Tenn., Clinch River above. 263	near	270
Temperature	Winfield, W. Va., Kanawha River	110 101
Temmessee River basin 245-276,286-289,293	at	110-121
Toledo, Ohio, Maumee River at buoy	near	327
31	Woodbury, Ky., Green River at	218
Maumee River at Craig Bridge 342-343	Worthington, Ohio, Olentangy River	2,0
Maumee River at Center C and O	near	137
Railroad dock		
Maumee River at Toledo Overseas	Y	
Terminal Dock		
Tomatla, N.C., Valley River at 268-269	Youghiogheny River at Connelsville,	
Tradewater River at Olney, Ky 234-240	Pa	53
Tradewater River basin	at Friendsville, Md	52
Tuckasegee River at Bryson City,	_	
N.C	Z	
at Dillsboro, N.C		10
Tug Fork at Kermit, W.Va	Zinc	16