1964

Water Quality Records in Missouri

[1966]

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the
Department of Public Health and Welfare of Missouri,
Water Pollution Board
and other agencies

United States
Department of the Interior
Geological Survey

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Department of Public Health and Welfare of Missouri,
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University of Missouri, the Department of Agriculture
Corps of Engineers, U.S. Army

Copies of this report may be obtained from
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U.S. Geological Survey
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Rolla, Missouri, 65401

Streamflow records for most of the water quality stations in this report are contained in the following companion volume:

Surface Water Records of Missouri

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

ILLUSTRATIONS

WATER QUALITY RECORDS IN MISSOURI, 1964

INTRODUCTION

The quality-of-water investigations of the U.S. Geological Survey are concerned with the chemical and physical characteristics of surface and ground water supplies of the Nation. The basic records for the 1964 water year for quality of surface waters within the State of Missouri are given in this report. The data were collected and computed by the Water Resources Division of the U.S. Geological Survey, under the direction of John H. Hubble, district chemist.

The Geological Survey began publishing annual basic records of chemical quality, water temperatures, and suspended sediment in 1941 in the water-supply-paper series, "Quality of Surface Waters of the United States." The records for Missouri were first published in this series in 1948 when the records were being published in two volumes for the entire country. Beginning in 1950, the records were published in four volumes. Since 1959 these records have been published in five volumes; each volume covering an area where boundaries coincide with those of certain natural drainage areas. The records for Missouri are contained in Parts 5-6, 7 and 8 of the water-supply series. These publications are available in most major public libraries. (See "Water-Supply Papers" p. 11.)

Distribution of this report is limited and it is primarily for local and immediate use. The records will be published in the Geological Survey water-supply papers at 5-year intervals. The first compilation will cover only the years 1964 and 1965.

COOPERATION

The work was done under a cooperative agreement between the U.S. Geological Survey and the Missouri Water Pollution Board, Jack K. Smith, executive secretary.

Assistance in the form of funds was given by the Corps of Engineers, U.S. Army and the University of Missouri, Department of Agriculture.

Discharge and thermograph records were collected and computed under the direction of Anthony Homyk, district engineer, U.S. Geological Survey, Water Resources Division, Surface Water Branch, Rolla, Missouri, in cooperation with the Missouri Geological Survey and Water Resources Division, Dr. Thomas R. Beveridge, state geologist.

DEFINITION OF TERMS AND ABBREVIATIONS

The terms and abbreviations of water-quality and hydrologic data, as used in the text and tabular data of this report, are defined as follows:

Acre-foot (ac-ft) is a quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet or 325,851 gallons. The term is commonly used in measuring volumes of water used or stored.

Cfs-day is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It equals 86,400 cubic feet, 1.983471 acre-feet, or 646,317 gallons.

Channel (watercourse) is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. River, creek, run, branch, anabranch, and tributary are some of the terms used to describe natural channels. Natural channels may be single or braided. Canal and floodway are some of the terms used to describe artificial channels.

Cubic feet per second (cfs) is a unit expressing rates of discharge. One cubic foot per second is equal to the discharge of a stream of rectangular cross section, 1 foot wide and 1 foot deep, flowing water at an average velocity of 1 foot per second.

Discharge, in its simplest concept, means outflow; therefore, the use of this term is not restricted as to course or location, and it can be applied to describe the flow of water from a pipe or from a drainage basin. It is also correct to speak of the discharge of a canal or stream into a lake, a stream, or an ocean.

Daily mean discharge is the mean discharge for one day.

Mean daily discharge is the arithmetic mean discharge for the same day during a specific period of years.

Mean discharge is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge (at time of sampling). If the discharge value at the time of sampling is reported instead of daily mean value, the heading of the discharge column will be "Discharge (cfs)."

Drainage area is that area, in a specified location, measured in a horizontal plane, which is enclosed by a drainage divide.

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

Equivalents per million (epm) is a unit for expressing the concentration of chemical constituents in terms of the interreacting values of the electrically charged particles, or ions, in solution. One equivalent per million of a positively charged ion will react with one equivalent per million of a negatively charged ion. Parts per million is converted to equivalents per million by multiplying by the reciprocal of the combining weight of the ion.

Conversion factors: Parts per million to equivalents per million

Ion	Multiply by	Ion	Multiply by
Aluminum (Al^{+3})	0.11119	Hydroxide (OH^{-1})	0.05880
Arsenic (As^{+3})	.04004	Iodide (I^{-1})	.00788
Barium (Ba^{+2})	.01456	Iron (Fe^{+3})	.05372
Beryllium (Be^{+2})	.22192	Lead (Pb^{+2})	.00965
Bicarbonate (HCO_3^{-1})	.01639	Lithium (Li^{+1})	.14411
Bromide (Br^{-1})	.01251	Magnesium (Mg^{+2})	.08226
Cadmium (Cd^{+2})	.01779	Manganese (Mn^{+2})	.03640
Calcium (Ca^{+2})	.04990	Nickel (Ni^{+2})	.03406
Carbonate (CO_3^{-2})	.03333	Nitrate (NO_3^{-1})	.01613
Chloride (Cl^{-1})	.02821	Phosphate (PO_4^{-3})	.03159
Chromium (Cr^{+6})	.11539	Potassium (K^{+1})	.02557
Cobalt (Co^{+2})	.03394	Sodium (Na^{+1})	.04350
Copper (Cu^{+2})	.03148	Strontium (Sr^{+2})	.02282
Fluoride (F^{-1})	.05264	Sulfate (SO_4^{-2})	.02082
Hydrogen (H^{+1})	.99209	Zinc (Zn^{+2})	.03060

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

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of gage height or discharge are obtained. When used in connection with a discharge record, the term is applied only to those gaging stations where a continuous record of discharge is obtained.

Hardness of water is the property of water attributable to the presence of alkaline earths and is expressed as equivalent calcium carbonate ($CaCO_3$). Hardness is a physical-chemical characteristic, not a substance.

Particle size is the diameter, in millimeters (mm) of suspended sediment or bed material determined by sieve and sedimentation methods.

Particle-size classification is the classification recommended by the American Geophysical Union Subcommittee on sediment terminology (Lane and others, 1947, p. 937).

According to this classification, a particle having a diameter:

Less than 0.004 mm is clay.
Between 0.004 and 0.062 mm is silt.
Between 0.062 and 2.0 mm is sand.

Parts per million (ppm) is a unit for expressing the concentration of chemical constituents by weight, usually as grams of constituents per million grams of a solution. In the laboratory the results are expressed in weights of solutes in a given volume of water. To express the results in parts per million, the data must be converted. For most waters this conversion is made by assuming that a liter of water weighs 1 kilogram; and thus milligrams per liter is equivalent to parts per million. Parts per million, for suspended sediment, is computed as 1 million times the ratio of the weight of sediment to the weight of the mixture of water and sediment.

Sediment is solid material both mineral and organic that is transported by, suspended in, or deposited by water. The amount, characteristics and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are: degree of slope, length of slope, soil characteristics, land usage, and amount and intensity of precipitation.

Sediment discharge is the rate at which dry weight of sediment passes a section of a stream or is the quantity of sediment, as measured by dry weight, or by volume, that is discharged in a given time.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks and dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current and is expressed in micromhos per centimeter at 25°C. Because the specific conductance is related to the number and specific chemical types of ions in solution, it can be used for approximating the salinity of the water. The following general relations are applicable:

Specific conductance x (0.65 ± 0.05) = ppm dissolved solids;

$$\frac{\text{Specific conductance}}{100} = \frac{\text{total epm}}{2}$$

Sodium-adsorption-ratio (SAR) is the expression of relative activity of sodium ions in exchange reaction with soil and is an index of sodium or alkali hazard to the soil. This ratio should be known especially for water used for irrigating farm land.

Stage is the height of a water surface above an established datum plane; also gage height.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff," as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Thermograph is a thermometer for continuously recording variations of temperature automatically on a chart. The term "temperature recorder" is used to indicate the location of the thermograph in station descriptions in the table headings.

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the water year.

Tons per acre-foot indicates the dry weight of dissolved solids in one acre-foot of water. It is computed by multiplying the concentration in parts per million by 0.00136.

Tons per day is a quantity of a substance in solution or suspension that passes a stream section during a 24-hour period.

Water year in Geological Survey reports dealing with water supply is the 12-month period, October 1 through

September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ended September 30, 1964, is called the "1964 water year."

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

STATION NUMBERS

A station number has been assigned as an added means of identification for each stream location where regular measurements of streamflow and determinations of water quality have been made. The numbers have been assigned to conform with the standard downstream order of listing gaging stations. The numbering system consists of two digits followed by a hyphen and a six digit number. The notation to the left of the hyphen identifies the Part or hydrologic region used by the Geological Survey for reporting hydrologic data. The number to the right of the hyphen represents the position of the location in the standard downstream order listing the stations within each of the parts. The assigned numbers are in numerical order but are not consecutive. They are so selected from the complete six digit number scale that intervening numbers will be available for future assignments to new locations. The identification number for each station in this report is printed to the left of the station name and contains only the essential digits. For example, the number is printed as 7-100 for a station whose complete identification number is 07-0100.00.

COLLECTION AND EXAMINATION OF SAMPLES

Water samples for chemical and physical analyses are usually collected at or near points on streams where gaging stations are maintained by the Geological Survey for measurement of discharge. These discharge records have been released in one volume as Surface Water Records of Missouri, 1964, by U.S. Department of the Interior, Geological Survey.

Most of these records are used in conjunction with the computations of the chemical constituents and sediment loads in the report.

The map on page 9 shows the distribution and number of stations in each river or drainage basin.

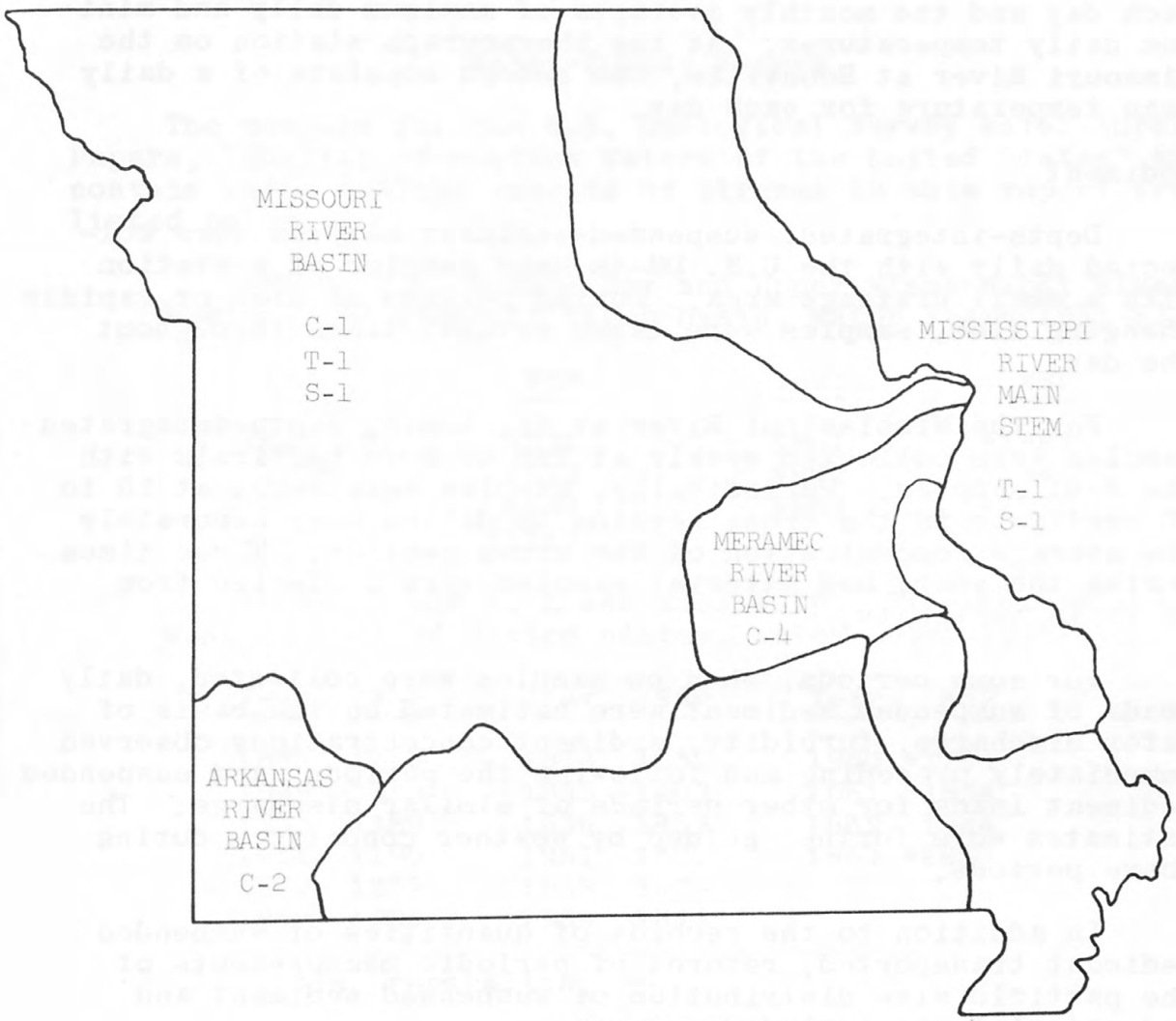
Solutes

The methods of collecting and compositing water samples for determining the concentration of solutes are described by Rainwater and Thatcher (1960). One sample can adequately define the water quality at a given time if the mixture of solutes throughout the stream-cross section is homogeneous. However, the concentration of solutes at different locations in the stream-cross section may vary widely with different rates of water discharge depending on the source of material and the turbulence and mixing of the stream. It is necessary to sample some streams at several verticals across the channel to determine accurately the solute load. 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 the equivalent of three composite samples per month, modifications usually are made on the basis of dissolved-solids content, as indicated by measurements of conductivity of daily samples. Samples collected at monthly and miscellaneous water quality stations were analyzed individually. The measurements are supplemented by other information, such as chloride content, river stage and weather conditions.

Temperature

Water temperatures were measured at most of the water-quality stations. For daily stations, the water temperatures were taken at about the same time each day in order that the data would be relatively unaffected by diurnal variations in temperature. Most large, 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 the 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



Letter symbols C, T, and S indicate chemical-quality, water-temperature, and sediment stations, respectively in operation during the 1964 water year. Figure following letter symbol indicates number of stations in operation.

Figure 1.--Map of Missouri showing distribution and number of water-quality stations.

each day and the monthly averages of maximum daily and minimum daily temperatures. At the thermograph station on the Missouri River at Boonville, the record consists of a daily mean temperature for each day.

Sediment

Depth-integrated, suspended-sediment samples were collected daily with the U.S. DH-48 hand sampler at a station with a small drainage area. During periods of high or rapidly changing flow, samples were taken several times throughout the day.

For the Mississippi River at St. Louis, depth-integrated samples were collected weekly at two or more verticals with the P-61 sampler. Periodically, samples were taken at 10 to 20 verticals in the cross section to define more accurately the average concentration of the cross section. Three times during the year, bed material samples were collected from 15 to 18 verticals.

For some periods, when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, turbidity, 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 during these periods.

In addition to the records of quantities of suspended sediment transported, records of periodic measurements of the particle size distribution of suspended sediment and bed material are included.

Water-Supply Papers

The numbers for the U.S. Geological Survey Water-Supply Papers, "Quality of Surface Waters of the United States" which contain water quality records of streams in this report are listed below:

Parts 5-6, Hudson Bay and Upper Mississippi River basins, and Missouri River basin, water years 1953-63.

Year	WSP	Year	WSP
1953-57	1521	1961	*1883
1958	1572	1962	1943
1959	1643	1963	*1949
1960	*1743		

Parts 7 and 8, Lower Mississippi River basin and western Gulf of Mexico basins, water years 1948-63.

Year	WSP	Year	WSP	Year	WSP
1948	1133	1954	1352	1960	*1744
1949	1163	1955	1402	1961	*1884
1950	1188	1956	1452	1962	1944
1951	1199	1957	1522	1963	*1950
1952	1252	1958	1573		
1953	1292	1959	1644		

*In preparation.

REFERENCES

The following publications are available for background information on the methods for collecting, analyzing and evaluating the chemical and physical properties of surface waters:

Colby, B. R., and Hubbell, D. W., 1961, Simplified methods for computing total sediment discharge with the modified Einstein procedure: U.S. Geol. Survey Water-Supply Paper 1593, 17 p.

Hem, John D., 1959, Study and interpretation of the chemical characteristics of natural water: U.S. Geol. Survey Water-Supply Paper 1473, 269 p.

Lane, E. W. and others, 1947, Report of Subcommittee on terminology: Am. Geophys. Union Trans., v. 28, p. 937.

Langbein, W. B., and Iseri, Kathleen T., 1960, General introduction and hydrologic definitions: U.S. Geol. Survey Water-Supply Paper 1541-A, 29 p.

Rainwater, F. H., and Thatcher, L. L., 1960, Methods for collection and analysis of water samples: U.S. Geol. Survey Water-Supply Paper 1454, 301 p.

U.S. Inter-Agency Committee on Water Resources, A study of methods used in measurement and analysis of sediment loads in streams:

Report 7, 1943, A study of methods used in measurement and analysis of sediment loads in streams, a study of new methods of size analysis of suspended sampler: U.S. Engineer Office, St. Paul, Minn., p. 82-90.

Report 11, 1957, The development and calibration of visual accumulation tube: St. Anthony Falls Hydraulic Lab., Minneapolis, Minn., 109 p., 43 figs.

Report 12, 1957, Some fundamentals of particle-size analysis: U.S. Govt. Printing Office, Washington, D.C. 20402, 55 p. 9 figs.

Report AA, 1959, Federal Inter-agency sedimentation instruments and reports: St. Anthony Falls Hydraulic Lab., Minneapolis, Minn., 41 p. 27 figs.

Report 13, 1961, The single-stage sampler for suspended sediment: U.S. Govt. Printing Office, Washington, D.C. 20402, 105 p. 51 figs.

Report 14, 1963, Determinations of fluvial sediment discharge: U.S. Govt. Printing Office, Washington, D.C. 20402, 151 p. 70 figs.

PART 6. MISSOURI RIVER BASIN

LITTLE CHARITON RIVER BASIN

6-9063. EAST FORK CHARITON RIVER NEAR HUNTSVILLE, MO.

LOCATION.--At gaging station at downstream side of left pile bent of bridge on County Highway C, 1 mile downstream from Sugar Creek, and 1.5 miles northwest of Huntsville, Randolph County.
DRAINAGE AREA.--220 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1963 to September 1964.
EXTREMES, December 1963 to September 1964.--Specific conductance: Maximum, 2,390 micromhos Feb. 18; minimum, 150 micromhos Sept. 9-11.
REMARKS.--Stream frozen on many days during winter months.

Chemical analyses, in parts per million, September 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Immediate acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
Sept. 1, 1963	0.6	--	--	0.11	19	168	82	--	--		0	0	810	--	--	--	--	--	757	757	0.8	1280	4.3	--		
Sept. 17.....	.6	5.7	21	3.1	18	172	79	16	6.6		0	0	874	4.0	0.7	1.5	0.00	1300	755	755	3.3	1200	3.5	2		
Oct. 9.....	.2	12	16	1.4	23	173	114	25	7.4		0	0	1070	18	1.8	.4	.08	1620	901	901	1.8	1400	4.2	--		
Nov. 13.....	.2	18	15	8.6	14	218	112	44	9.7		0	0	1270	11	1.8	.3	.18	1790	1000	1000	2.8	1490	2.6	18		
Dec. 3.....	.8	10	9.6	5.8	6.2	245	117	34	9.0		0	0	1240	11	.8	.7	.13	1800	1090	1090	2.3	1800	2.9	4		
Feb. 10, 1964	.5	10	6.8	5.4	15	298	137	46	6.5		0	0	1410	16	.9	.1	.00	2150	1310	1310	1.7	2180	3.8	2		
Mar. 10.....	50	7.7	.0	2.2	3.3	143	55	20	4.5		36	0	588	5.5	.4	3.4	.03	890	584	554	--	1150	6.3	9		
Mar. 31.....	110	8.1	.4	.62	1.3	78	28	15	4.2		66	0	264	7.0	.2	3.3	.01	494	310	256	--	630	7.4	8		6
Apr. 21.....	1060	9.4	2.3	.21	.4	46	14	7.0	4.1		52	0	144	2.0	.3	2.8	.24	217	173	130	--	380	7.3	70		
May 13.....	16	6.2	.1	.96	4.8	187	85	29	5.6		108	0	756	12	.5	.2	.03	1220	817	728	--	1340	7.2	5		
June 9.....	12	6.8	.1	.06	2.7	167	74	24	4.6		52	0	702	8.0	.5	.8	.04	1120	722	679	--	1250	6.3	12		
July 7.....	1.4	7.7	.2	.21	.4	97	45	23	6.1		66	0	388	19	.6	.1	.04	668	427	373	--	850	7.1	10		
Sept. 9.....	A198	6.8	1.4	.72	.00	9.2	2.2	2.3	5.0		27	0	16	1.5	.4	2.7	.06	63	32	10	--	90	7.0	130		

A Daily mean discharge.

Date of collection	Dissolved oxygen: Parts per million	Dissolved oxygen: Percent saturation	Organics: Phenols as C_6H_5OH	Organics: Alkyl benzene sulfonate (ABS)	Ammonia nitrogen as NH_4	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Temperature
Oct. 9, 1963.....	8.4	93						6	69
Nov. 13.....	9.5	73						7	39
Dec. 3.....	--	--						6	38
Mar. 31, 1964.....	--	--						60	38
Apr. 21.....	--	--						330	61
June 9.....	--	--						8	78
July 7.....	--	--						25	84
Sept. 9.....	--	--						550	72

6-9063. EAST FORK CHARITON RIVER NEAR HUNTSVILLE, MO.--Continued

Specific conductance, in micromhos at 25°C, December 1963 to September 1964

	OCTOBER			NOVEMBER			DECEMBER		
	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average
1..							--	--	--
2..							--	--	--
3..							--	--	E 1900
4..							1970	1900	1950
5..							1970	1970	1970
6..							1970	1940	1950
7..							1940	1900	1920
8..							1900	1900	1900
9..							1900	1880	1900
10..							1880	1840	1880
11..							1840	1800	1800
12..							1810	1800	1800
13..							1820	1810	1810
14..							1820	1820	1820
15..							1810	1800	1800
16..							1800	1800	1800
17..							1800	1800	1800
18..							1820	1800	1810
19..							--	--	E 2000
20..							--	--	E 2000
21..							--	--	E 2000
22..							--	--	--
23..							--	--	--
24..							--	--	--
25..							--	--	--
26..							--	--	--
27..							--	--	--
28..							--	--	--
29..							--	--	--
30..							--	--	--
31..							--	--	--

	JANUARY			FEBRUARY			MARCH		
1..	--	--	--	2130	2130	2130	--	--	--
2..	--	--	--	2170	2130	2150	--	--	--
3..	--	--	--	2200	2170	2180	--	--	--
4..	--	--	--	2210	2200	2200	--	--	--
5..	--	--	--	2220	2210	2220	--	--	--
6..	--	--	--	2220	2220	2220	--	--	--
7..	--	--	--	2220	2220	2220	--	--	--
8..	--	--	--	2220	2220	2220	--	--	--
9..	--	--	--	2200	2200	2200	--	--	--
10..	--	--	--	2200	2180	2180	--	--	--
11..	--	--	--	2180	2180	2180	1340	1200	1300
12..	--	--	--	2180	2170	2180	1340	1340	1340
13..	--	--	--	2300	2170	2200	1340	1340	1340
14..	--	--	--	2210	2200	2210	1480	1340	1410
15..	--	--	--	2200	2200	2200	1480	1450	1470
16..	--	--	--	2300	2210	2260	1450	1370	1420
17..	--	--	--	2350	230	2320	1370	1370	1370
18..	--	--	--	2370	2350	2370	1380	1370	1380
19..	--	--	--	2390	2370	2380	1380	1380	1380
20..	--	--	--	2370	2350	2350	1390	1380	1390
21..	--	--	--	2350	2350	2350	1390	1140	1240
22..	--	--	--	2350	2350	2350	1140	1040	1080
23..	--	--	--	2350	2280	2310	1040	1040	1040
24..	--	--	--	2280	2190	2260	1120	1040	1090
25..	--	--	--	2180	2180	2180	1160	1080	1150
26..	--	--	--	--	--	--	1080	695	790
27..	2110	2070	2090	--	--	--	880	770	820
28..	2140	2110	2130	--	--	--	880	590	700
29..	2180	2140	2160	--	--	--	600	590	595
30..	2190	2180	2180	--	--	--	600	600	600
31..	--	--	E 2130	--	--	--	650	600	640

E Estimated.

6-9063. EAST FORK CHARITON RIVER NEAR HUNTSVILLE, MO.--Continued

Specific conductance, in micromhos at 25°C, December 1963 to September 1964--Continued

	APRIL			MAY			JUNE		
	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average
1..	750	650	690	630	530	580	930	850	875
2..	910	750	840	695	630	665	850	850	850
3..	1010	910	930	780	695	730	855	850	850
4..	1010	720	790	830	780	805	870	855	860
5..	755	345	490	845	830	840	1390	870	1090
6..	405	360	390	855	845	850	1390	920	1080
7..	360	250	300	950	855	910	1100	1065	990
8..	385	245	280	950	950	950	--	--	E 1200
9..	520	385	470	990	940	960	--	--	E 1300
10..	610	520	570	1030	990	1020	--	--	--
11..	700	610	655	1190	1030	1080	--	--	--
12..	780	700	740	1200	1180	1180	--	--	--
13..	815	780	796	1450	1180	1370	--	--	--
14..	880	815	840	1480	1320	1440	--	--	--
15..	930	880	900	1480	1480	1480	--	--	--
16..	970	930	950	1470	1440	1470	--	--	--
17..	1000	970	990	1440	1420	1430	--	--	--
18..	1080	1000	1040	1440	1420	1420	--	--	--
19..	1160	1080	1120	1490	1440	1480	--	--	--
20..	1130	480	820	1500	1490	1500	--	--	-
21..	445	380	415	1500	1320	1400	--	--	--
22..	385	270	325	1330	1320	1320	--	--	--
23..	415	265	280	1340	1330	1330	--	--	--
24..	520	280	460	1660	1340	1500	--	--	--
25..	615	520	570	1560	1430	1480	--	--	--
26..	755	615	680	1650	1300	1440	--	--	--
27..	730	475	525	1990	1330	1700	--	--	--
28..	595	485	550	1990	1780	1900	--	--	--
29..	485	445	460	1780	1510	1730	--	--	--
30..	530	440	490	1510	1230	1410	--	--	--
31..	--	--	--	1230	930	1080	--	--	--

	JULY			AUGUST			SEPTEMBER		
1..	--	--	--	--	--	--	--	--	--
2..	--	--	--	--	--	--	--	--	--
3..	--	--	--	--	--	--	--	--	--
4..	--	--	--	--	--	--	--	--	--
5..	--	--	--	--	--	--	--	--	--
6..	--	--	--	--	--	--	--	--	--
7..	--	--	E 860	--	--	--	--	--	--
8..	970	860	875	--	--	--	--	--	--
9..	970	945	955	--	--	--	--	--	E 150
10..	945	905	915	--	--	--	150	150	150
11..	2290	910	1280	--	--	--	150	150	150
12..	1250	575	800	--	--	--	155	150	155
13..	705	575	615	--	--	--	170	155	160
14..	765	705	750	--	--	--	195	170	185
15..	765	765	765	--	---	--	210	195	200
16..	765	755	760	--	--	--	440	210	265
17..	755	755	755	--	--	--	1490	390	900
18..	755	755	755	--	--	--	690	280	435
19..	780	755	760	--	--	--	280	280	280
20..	820	780	800	--	--	--	290	280	280
21..	880	820	860	--	--	--	860	295	530
22..	940	890	920	--	--	--	1190	250	415
23..	--	--	E 940	--	--	--	1280	430	790
24..	--	--	--	--	--	--	630	350	435
25..	--	--	--	--	--	--	1360	350	1040
26..	--	--	--	--	--	--	1040	830	955
27..	--	--	--	--	--	--	900	710	760
28..	--	--	--	--	--	--	800	695	750
29..	--	--	--	--	--	--	695	695	695
30..	--	--	--	--	--	--	690	690	690
31..	--	--	--	--	--	--	--	--	--

E Estimated.

6-9066. BURGE BRANCH NEAR ARROW ROCK, MO.

LOCATION.--At gaging station on right bank, 30 feet upstream from culvert on county road, 1.5 miles south of Arrow Rock, Saline County.
DRAINAGE AREA.--0.33 square miles.
RECORDS AVAILABLE.--Sediment records: July 1961 to September 1964.
EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 4,260 ppm July 2; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 88 tons July 5; minimum daily, 0 tons on many days.
EXTREMES, 1961-64.--Sediment concentrations: Maximum daily, 5,360 ppm Mar. 20, 1962; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 251 tons Mar. 20, 1962; minimum daily, 0 tons on many days each year.
REMARKS.--Records good except for those from estimated-concentration graph, which are fair. No sediment discharge reported for four months of little or no flow, December 1963 to February 1964, and August 1964.

Suspended sediment, water year October 1963 to September 1964

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	0	--	0	0	--	0			
2..	0	--	0	0	--	0			
3..	0	--	0	0	--	0			
4..	0	--	0	0	--	0			
5..	0	--	0	0	--	0			
6..	0	--	0	0	--	0			
7..	0	--	0	0	--	0			
8..	0	--	0	0	--	0			
9..	0	--	0	0	--	0			
10..	0	--	0	0	--	0			
11..	0	--	0	0	--	0			
12..	0	--	0	0	--	0			
13..	0	--	0	0	--	0			
14..	0	--	0	0	--	0			
15..	0	--	0	0	--	0			
16..	0	--	0	0	--	0			
17..	0	--	0	0	--	0			
18..	.63	1330	B 3.0	0	--	0			
19..	.01	100	T	0	--	0			
20..	0	--	0	0	--	0			
21..	0	--	0	0	--	0			
22..	0	--	0	.01	100	T			
23..	0	--	0	0	--	0			
24..	0	--	0	0	--	0			
25..	0	--	0	0	--	0			
26..	0	--	0	0	--	0			
27..	0	--	0	0	--	0			
28..	0	--	0	0	--	0			
29..	0	--	0	0	--	0			
30..	0	--	0	0	--	0			
31..	0	--	0	--	--	--			
Total	0.64	--	3.0	0.01	--	0.0	0		0

T Less than 0.05 ton.
B Computed from estimated-concentration graph and subdividing day.

6-9066. BURGE BRANCH NEAR ARROW ROCK, MO.--Continued

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

Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..							0	--	0
2..							0	--	0
3..							0	--	0
4..							0	--	0
5..							.02	100	T
6..							.05	100	T
7..							.03	100	T
8..							.04	100	T
9..							.04	100	T
10..							.01	100	T
11..							0	--	0
12..							0	--	0
13..							0	--	0
14..							0	--	0
15..							0	--	0
16..							0	--	0
17..							0	--	0
18..							0	--	0
19..							.08	552 B	.2
20..							.18	100	T
21..							.03	100	T
22..							0	--	0
23..							0	--	0
24..							0	--	0
25..							.06	100	T
26..							.02	100	T
27..							.01	100	T
28..							.02	100	T
29..							0	--	0
30..							0	--	0
31..							0	--	0
Total	0		0	0		0	0.59	--	0.3

	APRIL			MAY			JUNE		
1..	0	--	0	0.02	100	0	0	--	0
2..	0	--	0	.01	100	0	0	--	0
3..	0	--	0	0	--	0	0	--	0
4..	.08	328 A	.7	.02	100	0	.04	100	T
5..	3.72	2460 B	88	0	--	0	.32	112 B	.6
6..	.06	100	T	0	--	0	.02	100	T
7..	.02	100	T	0	--	0	.01	100	T
8..	.01	100	T	0	--	0	.01	100	T
9..	0	--	0	0	--	0	0	--	0
10..	0	--	0	0	--	0	0	--	0
11..	0	--	0	0	--	0	0	--	0
12..	0	--	0	.01	100	0	0	--	0
13..	0	--	0	0	--	0	0	--	0
14..	0	--	0	0	--	0	.28	191 B	.3
15..	0	--	0	0	--	0	.05	100	T
16..	0	--	0	0	--	0	.01	100	T
17..	0	--	0	0	--	0	0	--	0
18..	.28	536 B	3.7	0	--	0	0	--	0
19..	.37	1890 B	4.3	0	--	0	.07	100	0
20..	.92	1180 B	14	0	--	0	.01	100	0
21..	1.12	1160 B	11	0	--	0	.28	160 B	.2
22..	.03	100	T	0	--	0	.02	100	T
23..	1.63	1160 B	14	0	--	0	0	--	0
24..	.03	100	T	0	--	0	0	--	0
25..	.02	100	T	0	--	0	0	--	0
26..	.91	558 S	6.6	0	--	0	0	--	0
27..	.22	100	.1	.16	411 B	1.6	0	--	0
28..	.04	100	T	.79	406 B	4.0	0	--	0
29..	.03	100	T	.01	100	0	0	--	0
30..	.01	100	T	0	--	0	0	--	0
31..	--	--	--	0	--	0	--	--	--
Total	9.50	--	142	1.02	--	5.6	1.12	--	1.1

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

6-9066. BURGE BRANCH NEAR ARROW ROCK, MO.--Continued

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

Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	0	0	0				0	--	0
2..	.78	4260 S	9.1				0	--	0
3..	1.02	473 B	2.4				0	--	0
4..	.02	100	T				0	--	0
5..	0	--	0				0	--	0
6..	0	--	0				0	--	0
7..	0	--	0				0	--	0
8..	0	--	0				0	--	0
9..	0	--	0				0	--	0
10..	0	--	0				0	--	0
11..	0	--	0				0	--	0
12..	.01	100	T				0	--	0
13..	0	--	0				0	--	0
14..	0	--	0				0	--	0
15..	0	--	0				0	--	0
16..	0	--	0				0	--	0
17..	0	--	0				0	--	0
18..	0	--	0				0	--	0
19..	0	--	0				0	--	0
20..	0	--	0				0	--	0
21..	0	--	0				0	--	0
22..	0	--	0				0	--	0
23..	0	--	0				0	--	0
24..	0	--	0				0	--	0
25..	0	--	0				0	--	0
26..	0	--	0				.01	100	T
27..	0	--	0				0	--	0
28..	0	--	0				0	--	0
29..	0	--	0				0	--	0
30..	0	--	0				0	--	0
31..	0	--	0				--	--	--
Total	1.83	--	11.5	0		0	0.01	--	0.0

Total discharge for year (cfs-days)..... 14.72
Total load for year (tons)..... 163.5

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

6-9066. BURGE BRANCH NEAR ARROW ROCK, MO.--Continued

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

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Apr. 7, 1964.....	0930	63		7.36	2520		50	58	70	82	93	98	100					SBWC
July 2.....	2330	75		17.1	3100		30	42	53	71	87	99	100					SBWC
July 2.....	2400	75		15.0	2730		53	64	74	89	95	99	100					SBWC

MISSOURI RIVER MAIN STEM

6-9090. MISSOURI RIVER AT BOONVILLE, MO.

LOCATION.--Temperature recorder at gaging station on downstream side of second pier from right abutment of Missouri-Kansas-Texas Railroad Company bridge at Boonville, Cooper County, River mile 196.6.
DRAINAGE AREA.--505,700 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: May 1953 to February 1959, October 1960 to September 1964.
EXTREMES, 1963-64.--Water temperatures: Maximum daily mean, 85°F July 25, 27; minimum daily mean, freezing point on several days during December and January.
EXTREMES, 1953-59, 1960-64.--Water temperatures: Maximum daily mean (1953-58, 1960-64), 90°F July 31 to Aug. 3, 1955; minimum daily mean, freezing point on many days during winter months.

Daily mean temperature (°F) of water, water year October 1963 to September 1964
(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	67	67	68	68	68	68	68	69	69	68	68	68	68	67	67	67	67	67	67	67	68	68	68	68	68	68	68	66	64	62	61	67
November	59	54	55	54	53	53	53	52	52	52	52	52	50	49	48	48	49	49	48	47	46	48	47	46	45	44	43	43	43	41	--	49
December	40	40	40	40	40	40	40	40	38	36	35	34	34	34	34	34	33	34	34	34	34	34	34	33	32	32	32	33	33	34	33	35
January	33	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	32	32	33	34	36	39	40	38	37	36	34	33	34	35	34
February	36	36	38	39	40	40	39	37	38	37	37	37	37	37	37	37	37	38	38	38	38	37	38	36	37	37	37	37	38	--	--	38
March	38	39	41	43	41	41	42	42	41	40	40	41	42	45	46	47	48	46	46	45	43	43	44	45	44	40	40	40	40	40	40	42
April	41	44	45	45	44	44	45	45	45	46	48	50	52	52	52	54	56	57	57	57	58	59	60	59	60	60	61	60	58	58	--	52
May	58	59	61	62	65	66	67	67	67	67	67	66	64	64	65	67	68	70	71	73	74	75	75	75	75	75	74	71	68	66	66	68
June	66	66	66	67	65	63	63	65	68	71	72	72	71	71	70	71	72	73	73	73	73	73	73	73	73	73	74	75	77	77	--	71
July	77	78	78	79	79	79	80	79	79	80	79	78	77	77	78	78	78	79	81	82	82	83	84	84	85	84	85	84	83	82	81	80
August	82	83	84	83	82	81	81	81	79	79	79	77	75	74	72	72	72	72	73	73	72	73	73	72	73	73	73	73	73	74	74	76
September	73	73	74	75	75	75	75	73	73	73	73	72	71	71	71	71	70	69	69	70	70	70	69	67	66	65	64	63	62	62	--	70

PART 7. LOWER MISSISSIPPI RIVER BASIN

MISSISSIPPI RIVER MAIN STEM

7-100. MISSISSIPPI RIVER AT ST. LOUIS, MO.

LOCATION.--At MacArthur Bridge, 1.1 miles downstream from gaging station, 16.1 miles downstream from Missouri River, 18.1 miles upstream from Meramec River, and 178.9 miles upstream from Ohio River.
DRAINAGE AREA.--701,000 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Water temperatures: October 1951 to September 1964.
Sediment records: April 1948 to September 1964.
EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 3,400 ppm Apr. 25; minimum daily, 29 ppm Jan. 19.
Sediment loads: Maximum daily, 2,600,000 tons Apr. 23-25; minimum daily, 3,100 tons Jan. 19.
EXTREMES, 1948-64.--Water temperatures: Maximum (1951-56, 1957-59), 89°F Aug. 2, 1955; minimum (1951-59), freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 6,420 ppm June 7, 1951; minimum daily, 29 ppm Jan. 19, 1964.
Sediment loads: Maximum daily, 7,010,000 tons May 5, 1951; minimum daily, 3,100 tons Jan. 19, 1964.
REMARKS.--Sediment loads for many days computed from turbidity readings.

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

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	--	--	--	--	--	--	--	69	--	--	--	--	--	--	--	--	--	--	--	--	70	--	--	--	--	--	--	--	64	--	--	--
November	--	--	--	--	--	--	56	--	--	--	52	--	48	47	--	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	--	--	--	41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	34	--	--	36	--	--	--	--	--	--	--	--	32	--	--	--	--	--	37	--	--	--	--	--	--	--	37	--	--
February	--	--	--	--	38	--	--	--	--	--	35	--	--	--	--	--	--	38	--	--	--	--	--	38	--	--	--	--	--	--	--
March	--	--	44	--	--	--	--	--	--	--	--	--	42	--	--	--	--	--	44	44	--	43	--	48	44	--	--	--	--	--	43	--
April	--	--	--	--	--	--	--	--	46	47	51	50	51	--	--	--	--	--	--	--	--	59	--	--	--	--	--	61	--	--	--	--
May	--	--	--	--	--	--	--	68	--	--	--	--	--	--	--	--	--	--	74	--	--	--	--	--	76	--	--	--	--	--	--	--
June	--	69	--	--	--	--	--	--	72	--	--	--	--	--	--	--	75	--	76	--	--	--	--	--	78	78	--	--	--	79	--	--
July	--	--	--	--	--	--	--	--	--	80	--	--	--	--	78	--	--	--	--	--	--	--	84	--	--	--	--	86	--	--	--	--
August	--	--	--	--	85	--	--	--	--	--	--	79	--	--	--	--	--	--	--	79	--	--	--	--	--	--	74	--	--	--	--	--
September	77	--	--	--	--	--	--	--	--	78	--	--	--	74	--	--	--	--	--	--	--	74	--	--	--	--	--	--	--	--	--	--

7-100. MISSISSIPPI RIVER AT ST. LOUIS, MO.--Continued

Suspended sediment, water year October 1963 to September 1964

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	69800	220	41000	74200	240	48000	67700	140	26000
2..	70600	210	40000	64900	300	53000	69800	120	23000
3..	69100	260	49000	62800	310	53000	64900	120	21000
4..	64200	220	38000	65600	280	50000	60000	120	19000
5..	63500	190	33000	70600	220	42000	64200	110	19000
6..	70600	210	40000	71300	220	42000	64200	110	19000
7..	70600	260	50000	68400	200	37000	59300	100	16000
8..	72700	380	75000	66300	220	39000	62100	120	20000
9..	67700	520	95000	66300	240	43000	58600	90	14000
10..	61400	400	66000	67700	260	48000	52500	100	14000
11..	66300	370	66000	66300	280	50000	49200	110	15000
12..	62800	270	46000	63500	240	41000	54600	96	14000
13..	62800	250	42000	64900	270	47000	53900	120	17000
14..	64900	220	39000	65600	160	28000	51900	110	15000
15..	62100	170	29000	63500	150	26000	46600	110	14000
16..	62100	180	30000	61400	140	23000	46000	95	12000
17..	64900	190	33000	63500	170	29000	40800	94	10000
18..	65600	230	41000	66300	180	32000	45300	83	10000
19..	65600	250	44000	64200	190	33000	39600	88	9400
20..	62800	190	32000	64200	180	31000	37700	51	5200
21..	64900	180	32000	67000	160	29000	37700	42	4300
22..	64200	170	29000	72000	140	27000	38900	99	10000
23..	65600	200	35000	83200	220	49000	38300	44	4600
24..	66300	180	32000	69800	230	43000	37700	39	4000
25..	66300	180	32000	76400	170	35000	36400	38	3700
26..	67000	190	34000	84800	200	46000	37700	40	4100
27..	66300	240	43000	83200	170	38000	39600	42	4500
28..	64900	240	42000	78700	160	34000	36400	41	4000
29..	68400	220	41000	76400	150	31000	36400	39	3800
30..	63500	220	38000	72700	160	31000	35800	50	4800
31..	67000	210	38000	--	--	--	34600	52	4900
Total	2044500	--	1325000	2085700	--	1158000	1498400	--	365300

	JANUARY			FEBRUARY			MARCH		
1..	35800	49	4700	54600	130	19000	47300	74	9500
2..	37700	53	5400	55200	100	15000	48600	78	10000
3..	38300	57	5900	56600	76	12000	46600	74	9300
4..	38900	55	5800	53900	80	12000	48600	72	9400
5..	39600	77	8200	53200	68	9800	56600	64	9800
6..	41500	58	6500	57900	63	9800	60000	72	12000
7..	40200	53	5800	53900	49	7100	62100	70	12000
8..	40800	56	6200	48600	48	6300	60700	78	13000
9..	46000	49	6100	54600	43	6300	69800	210	40000
10..	42700	57	6600	51900	45	6300	80200	170	37000
11..	41500	60	6700	50600	43	5900	91900	250	62000
12..	46000	61	7600	46600	48	6000	91900	150	37000
13..	45300	55	6700	52500	55	7800	91900	140	35000
14..	42700	43	5000	47300	72	9200	85600	110	25000
15..	43400	35	4100	47900	76	9800	75700	100	20000
16..	43400	34	4000	52500	89	13000	72700	88	17000
17..	42700	32	3700	47300	95	12000	83200	80	18000
18..	41500	30	3400	53200	85	12000	86400	80	19000
19..	40200	29	3100	51200	93	13000	77900	80	17000
20..	43400	30	3500	52500	91	13000	87100	89	21000
21..	42700	36	4200	55200	80	12000	80900	90	20000
22..	46000	46	5700	51200	77	11000	69100	80	15000
23..	57300	130	20000	53200	69	9900	68400	74	14000
24..	53200	82	12000	51200	69	9500	74900	66	13000
25..	60000	71	12000	52500	73	10000	75700	55	11000
26..	64200	120	21000	52500	73	10000	75700	77	16000
27..	61400	160	27000	49900	72	9700	86400	140	33000
28..	51900	170	24000	50600	69	9400	82500	150	33000
29..	48600	150	20000	49900	78	11000	87100	200	47000
30..	53200	150	22000	--	--	--	88700	220	53000
31..	56600	150	23000	--	--	--	96800	400	100000
Total	1426700	--	299900	1508200	--	297800	2311000	--	788000

7-100. MISSISSIPPI RIVER AT ST. LOUIS, MO.--Continued

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

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	90300	460	110000	243000	1500	980000	207000	2500	1400000
2..	89500	380	92000	237000	1300	830000	158000	2200	940000
3..	91900	400	99000	227000	1100	670000	134000	2700	980000
4..	87100	330	78000	216000	1300	760000	128000	2200	760000
5..	108000	390	110000	201000	1200	650000	121000	1800	590000
6..	207000	520	290000	186000	1100	550000	107000	1800	520000
7..	273000	1000	740000	181000	760	370000	107000	1500	430000
8..	265000	1600	1100000	180000	620	300000	119000	830	270000
9..	231000	1300	81000	175000	560	260000	120000	540	170000
10..	204000	1100	61000	168000	390	180000	111000	510	150000
11..	181000	870	43000	166000	340	150000	112000	460	140000
12..	162000	800	35000	184000	500	250000	108000	520	150000
13..	146000	670	26000	189000	430	220000	110000	770	230000
14..	134000	540	20000	184000	400	200000	102000	720	200000
15..	127000	390	13000	175000	660	310000	136000	590	220000
16..	125000	380	13000	170000	1200	550000	225000	1300	790000
17..	124000	330	11000	164000	1100	490000	245000	2000	1300000
18..	128000	310	11000	164000	1100	490000	251000	2300	1600000
19..	133000	610	22000	162000	860	380000	248000	1900	1300000
20..	149000	460	18000	164000	770	340000	219000	2500	1500000
21..	212000	790	45000	164000	730	320000	236000	2200	1400000
22..	260000	1700	1200000	163000	440	190000	278000	2500	1900000
23..	291000	3300	2600000	159000	400	170000	267000	2700	1900000
24..	306000	3100	2600000	156000	410	170000	265000	2300	1600000
25..	281000	3400	2600000	153000	460	190000	271000	2500	1800000
26..	271000	2400	1800000	150000	430	170000	281000	2700	2000000
27..	255000	1700	1200000	150000	480	190000	294000	3000	2400000
28..	252000	1200	820000	156000	320	130000	286000	2800	2200000
29..	246000	1200	800000	176000	620	290000	227000	2300	1400000
30..	237000	1300	830000	243000	1200	790000	181000	2400	1200000
31..	--	--	--	249000	1000	670000	--	--	--
Total	5666800	--	17468000	5655000	--	12210000	5654000	--	31440000

Day	JULY			AUGUST			SEPTEMBER		
1..	168000	2500	1100000	73500	320	64000	64200	360	62000
2..	155000	2200	920000	69800	290	55000	67700	230	42000
3..	137000	1800	670000	67000	260	47000	79400	170	36000
4..	123000	1400	460000	72000	240	47000	84000	190	43000
5..	121000	1300	420000	70600	220	42000	84000	260	59000
6..	121000	1200	390000	77900	210	44000	87900	610	140000
7..	115000	1100	340000	86400	180	42000	88700	950	230000
8..	106000	1000	290000	71300	190	37000	90300	570	140000
9..	114000	1100	340000	67000	180	33000	83200	460	100000
10..	119000	1200	390000	61400	160	27000	96000	540	140000
11..	121000	1200	390000	67000	160	29000	127000	1100	380000
12..	127000	1600	550000	61400	160	27000	139000	1100	410000
13..	121000	1200	390000	60000	160	26000	134000	820	300000
14..	121000	1000	330000	59300	180	29000	124000	880	290000
15..	108000	880	260000	60000	200	32000	115000	890	280000
16..	108000	1400	410000	63500	210	36000	105000	930	260000
17..	117000	1300	410000	62100	200	34000	104000	770	220000
18..	111000	1100	330000	61400	320	53000	110000	460	140000
19..	105000	2200	620000	58600	320	51000	108000	450	130000
20..	95100	2200	560000	60000	250	40000	108000	410	120000
21..	88700	1600	380000	64200	220	38000	109000	400	120000
22..	86400	1100	260000	77200	250	52000	110000	390	120000
23..	87100	600	140000	74900	230	47000	110000	540	160000
24..	87900	550	130000	67000	240	43000	104000	470	130000
25..	81700	580	130000	73500	230	46000	104000	400	110000
26..	84000	380	86000	84800	240	55000	104000	350	98000
27..	84000	300	68000	84000	230	52000	115000	350	110000
28..	77200	370	77000	85600	310	72000	117000	760	240000
29..	74900	340	69000	80200	320	69000	125000	1200	400000
30..	77200	260	54000	71300	250	48000	115000	850	260000
31..	74900	310	63000	66300	530	95000	--	--	--
Total	3317100	--	11027000	2159200	--	1412000	3112400	--	5270000

Total discharge for year (cfs-days)..... 36439000
Total load for year (tons)..... 83061000

7-100. MISSISSIPPI RIVER AT ST. LOUIS, MO.--Continued

Periodic determinations of suspended sediment discharge and particle size, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 21, 1963.....	1020	70		66300	232	41500	30	32		43		69	73	88	99	100		VPWC
Nov. 13.....	1350	48		64900	276	48400	33	48		76		93	94	100	--	--		VPWC
Mar. 3, 1964.....	0945	44		46600	58	7300	--	--		--		67	69	83	94	100		VWC
Mar. 22.....	1155	42		68400	85	15700	--	--		--		51	56	68	96	100		VWC
Mar. 24.....	1100	48		75700	94	19200	--	--		--		53	59	87	96	100		VWC
Apr. 9.....	1450	47		227000	1270	778000	19	31		64		84	90	99	100	--		VPN
Apr. 9.....	1450	47		227000	1270	778000	41	48		65		84	90	99	100	--		PWC
Apr. 10.....	1100	47		206000	1010	562000	22	33		62		84	90	100	100	--		VPN
Apr. 10.....	1100	47		206000	1010	562000	39	51		68		84	90	100	--	--		PWC
Apr. 13.....	1010	51		144000	621	241000	17	29		63		87	92	100	--	--		VPN
Apr. 13.....	1010	51		144000	621	241000	38	45		66		87	92	100	--	--		PWC
July 23.....	1100	84		87900	758	180000	--	--		--		--	--	--	--	--		
Aug. 20.....	1020	79		55900	263	39700	--	--		--		--	--	--	--	--		
Sept. 22.....	1200	74		110000	376	112000	--	--		--		--	--	--	--	--		

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

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material: Percent finer than size indicated, in millimeters											Method of analysis
							0.062	0.125	0.250	0.500	1.0	2.0	4.0	8.0	16.0	32.0		
Nov. 13, 1963.....	1350		15	64900			0	0	44	80	95	98	99	100				SV
Mar. 20, 1964.....	1125		18	89700			0	3	47	83	96	98	100	--				SV
Apr. 11.....	1200		18	182000			0	1	55	86	95	96	97	98	100			SV

7-145. MERAMEC RIVER NEAR SULLIVAN, MO.

LOCATION.--At gaging station on right bank at upstream side of Sappington Bridge, 3.8 miles downstream from Brazil Creek, and 4 miles southeast of Sullivan, Franklin County.
DRAINAGE AREA.--1,475 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1963 to September 1964.

Chemical analyses, in parts per million, August 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed (unfiltered)
																					Calcium, magnesium	Noncarbonate				
Aug. 6, 1963.	238	9.8	--	0.06	0.00	36	21	--	2.4	1.2	--	211	0	5.6	3.0	0.1	0.2	0.02	--	183	177	4	280	8.2	2	1
Sept. 17.....	238	4.1	0.08	.00	.00	35	24	0.03	2.4	1.0	0.00	211	4	5.2	2.4	.0	1.0	.00	0.03	183	186	6	355	8.3	2	1
Oct. 10.....	198	7.8	--	.02	.00	36	24	--	2.4	1.0	--	226	0	5.4	3.0	.0	.2	.29	--	183	189	4	340	8.2	--	1
Nov. 13.....	240	6.5	--	.04	.00	39	24	--	2.6	.9	--	227	0	6.8	3.6	.1	.1	.04	--	199	196	10	360	8.2	--	1
Dec. 19.....	249	5.1	.03	.09	.80	42	23	.02	2.8	.8	.00	237	0	7.2	4.0	.1	.8	.08	.03	195	200	6	420	8.2	1	1
Jan. 21, 1964	252	4.7	--	.02	.00	37	25	--	3.0	.7	--	224	0	7.0	4.0	.0	1.1	.05	--	191	196	12	360	7.8	1	0
Feb. 12.....	309	4.9	--	.00	.00	41	22	--	3.2	.8	--	227	0	6.0	4.5	.1	.2	.05	--	195	193	6	380	8.0	3	0
Mar. 10.....	13800	6.2	--	.41	.40	16	7.8	--	2.4	1.9	--	80	0	8.6	2.5	.2	2.1	.08	--	87	72	6	160	8.0	37	8
Mar. 31.....	624	5.4	.07	.05	.00	29	19	.02	2.2	.8	.00	159	4	8.6	4.0	.0	2.5	.00	.03	152	151	14	285	8.3	2	1
Apr. 22.....	1070	5.8	--	.03	.00	28	16	--	2.3	1.0	--	151	0	9.0	3.5	.1	2.7	.00	--	150	136	12	260	8.2	0	2
May 20.....	393	4.7	--	.03	.00	36	17	--	2.6	1.1	--	187	0	7.8	4.0	.1	1.0	.13	--	164	160	7	300	8.0	2	2
June 10.....	376	4.1	.02	.03	.01	35	19	.02	2.4	1.0	.00	183	4	7.0	3.6	.1	.5	.04	.02	163	166	9	300	8.3	5	1
July 7.....	288	7.0	--	.03	.01	34	20	--	2.4	1.0	--	197	0	6.0	2.8	.1	.6	.03	--	173	167	6	320	8.2	0	1
Aug. 12.....	182	8.5	--	.04	.00	35	23	--	2.6	1.2	--	201	4	6.0	3.5	.2	.3	.06	--	174	182	11	320	8.3	6	2
Sept. 10.....	165	9.2	--	.00	.00	36	23	--	2.6	1.0	--	217	0	5.4	3.2	.1	.2	.01	--	188	185	6	325	8.1	5	2

7-145. MERAMEC RIVER NEAR SULLIVAN, MO.--Continued

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics		Organic and ammonia nitrogen (N)	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Temperature
	Parts per million	Percent saturation	Phenols as C_6H_5OH	Detergent (ABS)					
Aug. 6, 1963	--	--		0.0	2.6			4	85
Sept. 17	8.2	91		.0	.00			9	70
Oct. 10	9.1	96		.0	2.2			6	65
Nov. 13	11.0	93		.0	.08			4	47
Dec. 19	13.9	95		.0	.92			9	32
Jan. 21, 1964	12.2	88		.0	.15			8	36
Feb. 12	12.6	93		.0	1.1			2	37
Mar. 10	10.5	82		.1	.84			400	41
Mar. 31	10.8	96		.0	.28			10	50
Apr. 22	8.6	86		.0	.52			7	60
May 20	7.9	95		.0	.55			4	77
June 10	9.0	111		.0	.40			1	80
July 7	7.7	96		.0	.37			5	81
Aug. 12	8.8	107		.0	.71			5	78
Sept. 10	8.3	102		.0	1.0			1	80

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Chromium		Nickel (Ni)	Copper (Cu)	Lead (Pb)	Zinc (Zn)	Cobalt (Co)	Barium (Ba)	Beryllium (Be)	Rubidium (Rb)	Vanadium (V)
		Total Cr	Cr^6									
Sept. 17, 1963	238	--		0.00	0.00	--	--	--	0.14	--	0.00	--
Dec. 19	249	0.00		.00	.00	0.00	<.11	0.00	.09	0.00	.00	0.00
Mar. 31, 1964	624	.00		.00	.00	.00	.05	.00	.07	.00	.00	.00
June 10	376	.00		.00	.00	.00	<.06	.00	.05	.00	.00	.00

BOURBEUSE RIVER ABOVE UNION, MO.

LOCATION.--At bridge on county road, 5 miles upstream from gaging station, and 0.5 mile south of Union, Franklin County.
DRAINAGE AREA.--808 square miles at Union.
RECORDS AVAILABLE.--Chemical analyses: August 1963 to September 1964.

Chemical analyses, in parts per million, August 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
Aug. 6, 1963.	26	7.8		0.15	0.00	27	17	3.6	2.2		155	0	14	4.0	0.2	0.2	0.00	171	138	10		260	8.1	7		2
Sept. 16.....	27	2.5		.00	.00	27	20	4.1	2.0		171	0	12	4.2	.1	.8	.00	164	150	10		307	8.2	4		2
Oct. 10.....	19	4.4		.05	.00	31	22	4.3	2.0		192	0	13	4.0	.2	.2	.05	183	168	10		310	8.2	--		2
Nov. 13.....	33	4.6		.09	.00	33	22	4.4	2.2		197	0	20	4.4	.1	.0	.03	211	173	12		320	8.0	--		3
Dec. 20.....	33	3.8		.08	.00	39	21	3.7	2.7		201	0	20	4.0	.2	.3	.05	192	184	20		361	8.0	6		3
Jan. 21, 1964	31	3.3		.13	.00	36	23	4.4	2.1		209	0	18	5.5	.1	.4	.05	189	185	14		360	7.9	2		2
Feb. 11.....	51	2.4		.05	.00	36	21	4.3	1.7		187	4	21	5.0	.1	.1	.06	221	177	17		340	8.4	2		2
Mar. 10.....	18000	5.4		.36	.00	14	6.6	4.5	2.3		56	0	22	5.0	.2	2.7	.00	81	62	16		165	7.2	23		6
Mar. 31.....	319	6.9		.26	.00	17	9.8	4.3	1.5		78	0	24	4.5	.1	2.7	.02	122	83	19		195	7.8	17		3
Apr. 22.....	702	6.4		.10	.00	22	12	4.4	1.6		99	0	28	5.0	.1	2.6	.00	142	105	24		230	8.0	0		3
May 20.....	127	3.6		.07	.00	24	15	4.2	1.5		124	0	21	4.5	.1	.3	.04	142	122	20		255	8.0	4		3
June 10.....	307	7.4		.11	.00	20	9.9	4.5	1.8		92	0	19	5.3	.1	2.0	.04	123	90	15		200	8.1	20		4
July 7.....	99	6.4		.25	.10	18	10	2.9	2.4		95	0	13	2.7	.1	2.0	.05	114	86	8		190	7.8	20		4
Aug. 12.....	37	6.3		.07	.10	29	19	4.1	2.1		161	0	21	4.0	.2	.2	.06	162	151	18		300	8.0	8		2
Sept. 10.....	31	6.3		.00	.01	31	19	3.7	1.8		170	0	19	4.0	.1	.1	.04	170	156	16		305	8.0	4		2

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Dissolved oxygen: Parts per million	Dissolved oxygen: Percent saturation	Organics: Phenols as C_6H_5OH	Organics: Detergent (ABS)	Organic and ammonia nitrogen (N)	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Temperature
Aug. 6, 1963.....	--	--		0.0	3.4			10	84
Sept. 16.....	8.0	92		.0	.08			9	73
Oct. 10.....	8.0	85		--	2.3			6	66
Nov. 13.....	10.3	86		.0	.16			6	46
Dec. 20.....	13.4	92		.0	.60			5	32
Jan. 21, 1964.....	12.9	88		.0	.12			10	32
Feb. 11.....	11.2	83		.0	.33			7	37
Mar. 10.....	10.6	86		.1	.80			400	44
Mar. 31.....	11.7	96		.0	.35			30	46
Apr. 22.....	8.4	86		.0	.46			15	63
May 20.....	8.0	98		.0	.50			6	78
June 10.....	8.5	104		.0	.87			15	78
July 7.....	6.0	75		.0	.42			25	81
Aug. 12.....	6.4	77		.0	.77			6	77
Sept. 10.....	6.6	80		.1	.39			2	77

7-180. BIG RIVER NEAR DeSOTO, MO.

LOCATION.--At gaging station near right bank on downstream side of pier of Mammoth Bridge, 300 feet upstream from Mammoth Creek, 1.5 miles downstream from Mineral Fork, and 6.5 miles west of DeSoto, Jefferson County.
DRAINAGE AREA.--718 square miles, including Mammoth Creek.
RECORDS AVAILABLE.--Chemical analyses: August 1963 to September 1964.

Chemical analyses, in parts per million, August 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed (unfiltered)
																					Calcium, magnesium	Noncarbonate				
Aug. 6, 1963.	100	9.0	--	0.11	0.00	52	33	--	5.5	2.0	--	270	4	44	7.4	0.1	0.2	0.00	--	290	265	38	460	8.3	1	1
Sept. 16.....	100	3.5	0.15	.00	.00	52	37	0.04	6.3	1.9	0.00	267	4	53	9.0	.0	.8	.01	0.05	299	282	56	537	8.4	3	1
Oct. 10.....	71	7.0	--	.04	.00	54	38	--	6.4	1.8	--	286	4	53	9.0	.1	.2	.04	--	318	291	50	550	8.3	--	1
Nov. 14.....	82	5.1	--	.06	.00	52	40	--	7.0	1.8	--	295	0	55	9.0	.0	.3	.09	--	327	294	52	520	8.1	--	1
Dec. 20.....	97	5.1	.02	.02	.30	62	37	.03	6.1	1.5	.00	292	9	54	8.5	.0	1.0	.03	.04	341	307	52	590	8.3	2	1
Jan. 21, 1964	163	3.9	--	.04	.00	51	35	--	7.0	1.5	--	240	8	61	10	.0	.9	.01	--	319	271	61	530	8.4	1	1
Feb. 12.....	186	3.9	--	.00	.00	50	32	--	5.5	1.3	--	221	20	42	7.5	.1	.4	.05	--	280	257	42	475	8.6	3	8
Mar. 10.....	15900	5.6	--	.46	.00	14	6.2	--	1.0	2.0	--	58	0	12	1.5	.2	2.1	.00	--	68	60	13	145	7.8	27	7
Apr. 1.....	345	4.7	.07	.03	.00	47	28	.02	4.6	1.2	.00	233	0	39	7.0	.0	1.7	.00	.04	251	232	41	435	8.2	0	0
Apr. 22.....	1280	5.2	--	.04	.00	43	26	--	4.9	1.8	--	197	7	43	6.0	.1	1.7	.00	--	246	214	41	419	8.5	0	2
May 21.....	168	4.6	--	.03	.00	53	30	--	5.0	1.5	--	257	0	41	7.0	.1	.7	.08	--	276	256	45	470	8.1	0	1
June 11.....	106	5.6	.03	.02	.00	53	33	.02	5.3	1.6	.00	271	0	43	7.6	.2	.6	.05	.04	282	268	46	460	8.1	1	1
July 6.....	116	6.0	--	.06	.00	53	35	--	6.0	1.7	--	266	0	52	8.5	.0	.4	.00	--	304	276	58	485	8.2	1	1
Aug. 12.....	62	5.8	--	.04	.00	51	35	--	6.2	2.0	--	264	0	51	9.0	.2	.2	.05	--	294	271	54	480	8.2	8	2
Sept. 10.....	78	7.4	--	.00	.04	54	33	--	6.2	1.9	--	260	0	53	9.5	.2	.0	.02	--	302	270	57	500	7.9	5	1

7-180. BIG RIVER NEAR DeSOTO, MO.--Continued

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics		Organic and ammonia nitrogen (N)	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Temperature
	Parts per million	Percent saturation	Phenols as C_6H_5OH	Detergent (ABS)					
Aug. 6, 1963.....	--	--		0.0	3.2			4	84
Sept. 16.....	9.4	113		.0	.16			15	77
Oct. 10.....	10.3	114		.0	2.4			4	69
Nov. 14.....	9.9	80		.0	.48			4	43
Dec. 20.....	12.6	86		.0	.64			4	32
Jan. 21, 1964.....	15.8	118		.1	.04			8	38
Feb. 12.....	13.0	96		.0	.26			3	37
Mar. 10.....	10.8	86		.0	.41			400	42
Apr. 1.....	11.2	95		.0	.66			20	48
Apr. 22.....	8.0	85		.1	.00			80	66
May 21.....	8.5	100		.0	.43			4	78
June 11.....	7.0	82		.0	.56			3	75
July 6.....	8.0	99		.0	.56			8	80
Aug. 12.....	9.2	111		.0	.62			6	77
Sept. 10.....	7.0	83		.0	.70			2	76

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Chromium		Nickel (Ni)	Copper (Cu)	Lead (Pb)	Zinc (Zn)	Cobalt (Co)	Arsenic (As)	Selenium (Se)	Cadmium (Cd)	Barium (Ba)	Beryllium (Be)	Rubidium (Rb)	Vanadium (V)
		Total Cr	Cr^6												
Sept. 16, 1963.....	100	--		0.00	0.00	0.01	--	--				0.36	--	--	--
Dec. 20.....	97	0.00		.00	.00	.00	<0.15	0.00				.32	0.00	0.00	0.00
Apr. 1, 1964.....	345	.00		.00	.00	.00	.08	.00				.23	.00	.00	.00
June 11.....	106	.00		.00	.00	.08	<.13	.00				.30	.00	.00	.00

7-190.45. MERAMEC RIVER AT PAULINA HILLS, MO.

LOCATION.--At bridge on State Highway 21 at Paulina Hills, Jefferson County, 0.3 mile downstream from Saline Creek, and 10 miles upstream from mouth.
DRAINAGE AREA.--3,950 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1963 to September 1964.
REMARKS.--Mean discharge calculated from flow at gaging station at Eureka, Mo.

Chemical analyses, in parts per million, August 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed	
																			Calcium, magnesium	Noncarbonate					Filtered	Unfiltered
Aug. 6, 1963.	446	8.2		0.35	0.00	40	22	8.4	1.8		211	0	18	12	0.2	0.3	0.00	224	191	18		370	8.2	5		--
Sept. 16.....	386	3.8		.00	.01	38	25	9.0	1.8		211	4	18	14	.1	1.0	.05	233	198	18		412	8.4	4		2
Oct. 10.....	292	6.7		.09	.00	40	26	11	1.6		213	10	20	16	.1	.2	.16	236	207	16		400	8.6	--		2
Nov. 14.....	459	4.0		.09	.00	47	25	8.4	1.7		244	0	20	13	.1	.3	.06	264	220	20		400	8.2	--		2
Dec. 20.....	470	3.6		.04	.00	46	27	9.5	1.5		247	0	21	16	.1	.2	.08	259	226	24		450	8.2	5		1
Jan. 21, 1964	498	1.9		.11	.00	42	29	8.6	1.2		239	3	22	14	.1	.5	.09	251	224	23		400	8.4	2		1
Feb. 12.....	659	1.9		.03	.00	42	26	7.6	1.2		191	20	22	13	.1	1.2	.09	234	212	22		400	8.6	3		1
Mar. 10.....	15900	5.6		.32	.00	26	12	4.0	1.9		110	4	21	5.5	.2	2.3	.00	127	115	18		225	8.4	21		6
Apr. 1.....	1760	6.8		.13	.00	33	18	6.3	1.3		161	0	21	10	.0	2.8	.08	186	157	24		365	8.1	5		2
Apr. 22.....	3810	6.7		.05	.00	33	18	6.1	1.4		161	5	21	9.0	.0	2.9	.02	196	157	16		320	8.5	0		2
May 20.....	1000	2.7		.06	.00	38	21	9.1	1.5		193	0	20	16	.1	.1	.08	210	182	24		375	8.1	2		2
June 11.....	1140	7.2		.02	.00	32	18	8.0	1.7		164	0	19	14	.1	1.4	.06	183	154	20		320	8.0	10		2
July 6.....	602	6.5		.04	.01	35	20	11	1.2		181	0	18	19	.1	.2	.06	205	170	21		365	7.9	2		2
Aug. 12.....	338	7.7		.12	.00	37	22	16	2.3		185	4	21	28	.2	.3	.15	235	183	25		380	8.4	12		3
Sept. 10.....	345	8.4		.00	.00	42	26	18	2.1		209	0	29	33	.2	.0	.03	265	212	41		470	7.9	5		2

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics		Organic and ammonia nitrogen (N)	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Temperature
	Parts per million	Percent saturation	Phenols as C_6H_5OH	Detergent (ABS)					
Aug. 6, 1963.....	--	--		0.0	3.0			20	88
Sept. 16.....	7.2	89		.0	.60			20	80
Oct. 10.....	8.4	95		.1	3.2			20	72
Nov. 14.....	9.2	79		.0	.56			25	48
Dec. 20.....	13.7	94		.0	1.0			5	32
Jan. 21, 1964.....	15.3	108		.1	.46			10	34
Feb. 12.....	13.4	99		.0	.66			25	37
Mar. 10.....	10.3	83		.0	.65			400	43
Apr. 1.....	11.1	91		.0	1.2			30	46
Apr. 22.....	8.4	88		.0	.14			50	65
May 20.....	8.3	100		.0	.48			19	80
June 11.....	7.4	89		.0	.75			35	77
July 6.....	6.2	80		.0	.53			35	84
Aug. 12.....	8.4	109		.0	1.0			20	84
Sept. 10.....	4.9	60		.0	.91			5	79

ARKANSAS RIVER BASIN

7-1864. CENTER CREEK NEAR CARTERVILLE, MO.

LOCATION.--At gaging station at downstream side of right pier of bridge on County Road HH, 1.5 miles downstream from Grove Creek, 3 miles east of Carterville, Jasper County, and 17 miles upstream from mouth.
DRAINAGE AREA.--232 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1962 to September 1964.
EXTREMES December 1963 to September 1964.--Specific conductance: Maximum, 1,510 micromhos Apr. 5; minimum, 160 micromhos Apr. 24.

Chemical analyses, in parts per million, August 1963 to September 1964

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed (unfiltered)
																					Calcium, magnesium	Noncarbonate				
Aug. 28, 1963.	26	30	0.03	0.08	0.02	72	4.2	0.02	17	2.2	0.00	61	0	119	18	32	40	25	0.02	347	197	147	610	7.1	7	1
Sept. 17.....	25	17	--	.04	.8	99	7.1	--	21	2.2	--	22	0	180	12	26	57	46	--	440	276	258	787	6.9	3	2
Oct. 8.....	23	38	--	.02	.8	72	11	--	26	2.8	--	4	0	195	15	15	88	59	--	434	225	222	750	7.0	--	1
Oct. 29.....	23	46	--	.02	.9	103	12	--	27	2.8	--	14	0	213	16	40	77	50	--	537	307	295	850	6.7	--	2
Dec. 18.....	23	23	.02	.04	.7	84	8.8	.02	22	2.2	.00	67	0	124	18	16	47	49	.03	490	246	191	800	7.4	5	1
Jan. 20, 1964.	18	12	--	.00	.6	75	6.2	--	16	3.3	--	114	0	159	18	12	40	7.6	--	341	213	119	625	7.0	2	2
Feb. 9.....	22	32	--	.18	1.1	103	6.6	--	20	2.4	--	39	0	202	17	39	25	47	--	464	284	252	875	6.5	4	2
Mar. 9.....	53	15	--	.10	.6	68	4.2	--	20	3.4	--	126	0	158	22	20	38	16	--	469	187	84	910	7.3	7	2
Mar. 30.....	33	20	.32	.07	.3	68	9.7	.04	13	1.8	.00	38	0	120	14	24	36	57	.04	339	210	179	650	6.7	0	2
Apr. 20.....	96	16	--	.02	.2	60	2.6	--	5.8	1.4	--	90	0	44	7.5	12	34	19	--	250	160	86	360	7.4	0	2
May 19.....	56	21	--	.06	.7	67	4.5	--	8.8	1.7	--	93	0	69	9.5	12	53	15	--	307	186	110	490	7.7	3	2
June 8.....	90	15	.06	.02	.2	56	2.8	.02	6.2	1.2	.00	103	0	41	7.1	4.7	24	9.3	.02	220	151	66	340	7.6	10	2
July 9.....	58	20	--	.01	.4	69	6.6	--	11	1.3	--	88	0	80	7.3	18	45	9.6	--	319	199	127	505	7.1	5	1
Aug. 6.....	--	44	--	.05	.4	86	4.7	--	14	2.3	--	7	0	126	11	27	74	20	--	426	234	229	645	4.8	7	--
Aug. 10.....	22	40	--	.21	.8	88	5.7	--	14	2.6	--	56	0	148	14	30	57	20	--	405	243	197	600	6.8	12	2
Sept. 1.....	43	26	--	.11	.01	70	8.5	--	14	2.6	--	82	0	93	9.0	30	48	19	--	375	210	143	520	6.9	5	--
Sept. 11.....	43	39	--	.00	.8	81	6.6	--	16	2.5	--	0	0	117	14	29	50	19	--	379	229	229	590	6.8	5	2

7-1864. CENTER CREEK NEAR CARTERVILLE, MO.--Continued

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics		Organic and ammonia nitrogen (N)	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Temperature
	Parts per million	Percent saturation	Phenols as C_6H_5OH	Detergent (ABS)					
Aug. 28, 1963.....	--	--		0.1	25			6	85
Sept. 17.....	9.4	115		.1	22			10	79
Oct. 8.....	9.2	104		.2	42			6	72
Oct. 29.....	8.2	78		.3	35			5	56
Dec. 18.....	13.9	95		.2	27			20	32
Jan. 20, 1964.....	11.6	96		.2	52			10	45
Feb. 9.....	12.4	102		.1	19			30	45
Mar. 9.....	11.5	91		.2	54			25	42
Mar. 30.....	12.3	100		.2	23			20	49
Apr. 20.....	7.8	89		.1	12			15	72
May 19.....	7.0	84		.1	9.8			9	77
June 8.....	6.1	74		.1	3.6			30	79
July 9.....	7.0	85		.1	9.7			30	78
Aug. 6.....	--	--		--	7.8			--	80
Aug. 10.....	6.8	86		.1	9.3			15	82
Sept. 1.....	7.4	90		.1	11	0.49		24	79
Sept. 11.....	5.7	66		.2	12			3	74

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Discharge (cfs)	Chromium		Nickel (Ni)	Copper (Cu)	Lead (Pb)	Zinc (Zn)	Cobalt (Co)	Barium (Ba)	Beryllium (Be)	Rubidium (Rb)	Vanadium (V)
		Total Cr	Cr^6									
Aug. 28, 1963.....	26	0.03		0.10	0.00	--	1.5	--	0.03	--	--	--
Dec. 18.....	23	.03		.01	.00	0.00	.92	0.00	.02	0.00	0.00	0.00
Mar. 30, 1964.....	33	.06		.01	.04	.00	.90	.00	.02	.00	.00	.01
June 8.....	90	.02		.02	.00	.00	.06	.00	.04	.00	.00	.00
Aug. 6.....	--	--		--	.07	.00	1.3	--	--	--	--	--

7-1864. CENTER CREEK NEAR CARTERVILLE, MO.--Continued

Specific conductance, in micromhos at 25°C, December 1963 to September 1964

	OCTOBER			NOVEMBER			DECEMBER		
	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average
1..							--	--	--
2..							--	--	--
3..							--	--	--
4..							--	--	--
5..							--	--	--
6..							--	--	--
7..							--	--	--
8..							--	--	--
9..							--	--	--
10..							--	--	--
11..							--	--	--
12..							--	--	--
13..							--	--	--
14..							--	--	--
15..							--	--	--
16..							--	--	--
17..							--	--	--
18..							--	--	--
19..							--	--	--
20..							--	--	--
21..							--	--	--
22..							--	--	--
23..							--	--	--
24..							--	--	--
25..							--	--	--
26..							--	--	--
27..							--	--	--
28..							915	915	915
29..							915	915	915
30..							915	915	915
31..							915	915	915

	JANUARY			FEBRUARY			MARCH		
	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average
1..	915	910	910	660	660	660	--	--	--
2..	910	910	910	660	660	660	--	--	--
3..	--	--	--	--	--	--	--	--	--
4..	--	--	--	--	--	--	--	--	--
5..	--	--	--	--	--	--	--	--	--
6..	--	--	--	--	--	--	--	--	--
7..	--	--	--	--	--	--	--	--	--
8..	--	--	--	--	--	--	--	--	--
9..	--	--	--	--	--	E 875	--	--	E 900
10..	--	--	--	850	815	820	830	750	765
11..	--	--	--	815	810	810	800	735	775
12..	--	--	--	865	860	860	745	735	740
13..	--	--	--	930	860	885	740	700	720
14..	--	--	--	995	930	950	670	665	670
15..	--	--	--	1000	1000	1000	665	640	650
16..	--	--	--	1000	845	880	640	640	640
17..	--	--	--	845	780	800	640	640	640
18..	--	--	--	920	780	800	720	640	685
19..	--	--	--	990	920	945	720	515	610
20..	--	--	E 600	1080	990	995	735	515	690
21..	610	600	600	1080	1080	1080	735	735	735
22..	615	610	610	1080	1080	1080	735	665	710
23..	655	615	640	--	--	--	665	650	650
24..	660	660	660	--	--	--	650	650	650
25..	660	660	660	--	--	--	680	650	655
26..	660	660	660	--	--	--	680	680	680
27..	665	665	665	--	--	--	715	680	705
28..	665	665	665	--	--	--	735	715	730
29..	665	665	665	--	--	--	730	730	730
30..	665	660	665	--	--	--	735	650	720
31..	660	660	660	--	--	--	775	720	750

E Estimated.

7-1864. CENTER CREEK NEAR CARTERVILLE, MO.--Continued

Specific conductance, in micromhos at 25°C, December 1963 to September 1964--Continued

	APRIL			MAY			JUNE		
	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average
1..	775	775	775	480	465	470	625	555	605
2..	775	770	770	500	480	490	670	625	650
3..	1270	770	850	510	500	500	670	670	670
4..	1230	560	940	525	510	520	670	245	590
5..	1510	210	450	550	525	540	815	245	675
6..	330	210	250	580	550	560	645	485	600
7..	395	320	380	610	580	590	--	--	--
8..	420	395	405	635	610	620	--	--	E 400
9..	510	420	470	650	635	650	480	410	440
10..	545	510	525	--	--	--	500	445	485
11..	615	545	580	--	--	--	510	485	500
12..	635	615	630	--	--	--	640	180	510
13..	640	635	635	--	--	--	600	345	515
14..	640	640	640	--	--	--	500	495	495
15..	640	600	625	--	--	--	500	495	495
16..	600	600	600	--	--	--	510	500	500
17..	--	--	--	--	--	--	525	510	515
18..	--	--	--	--	--	--	535	525	535
19..	--	--	--	--	--	--	545	535	540
20..	--	--	--	525	515	515	550	545	550
21..	--	--	E 480	580	525	565	555	550	555
22..	480	460	475	590	580	585	555	555	555
23..	475	460	460	600	590	600	560	555	555
24..	965	160	310	640	375	575	575	560	570
25..	345	285	320	640	635	640	--	--	--
26..	380	345	365	665	635	640	--	--	--
27..	395	380	385	665	585	620	--	--	--
28..	420	400	410	680	630	665	--	--	--
29..	435	420	430	710	680	700	--	--	--
30..	465	435	450	710	650	690	--	--	--
31..	--	--	--	650	555	580	--	--	--

	JULY			AUGUST			SEPTEMBER		
1..	--	--	--	650	650	650	665	655	660
2..	--	--	--	655	650	655	690	665	675
3..	--	--	--	655	655	655	700	690	700
4..	--	--	--	655	655	655	750	700	705
5..	--	--	--	655	650	655	755	750	750
6..	--	--	--	--	--	E 650	775	755	770
7..	--	--	--	--	--	E 650	785	765	775
8..	--	--	--	--	--	E 650	800	775	785
9..	--	--	--	--	--	E 665	800	795	800
10..	585	570	580	--	--	E 665	815	800	800
11..	610	585	600	665	655	655	--	--	E 650
12..	635	610	620	695	665	675	655	650	650
13..	650	635	650	700	695	700	665	655	665
14..	655	650	655	700	700	700	685	665	680
15..	665	655	660	725	700	715	705	685	700
16..	660	660	660	745	725	730	725	705	720
17..	660	655	660	750	745	750	750	725	745
18..	655	655	655	760	750	755	765	750	760
19..	660	655	660	775	760	770	775	765	770
20..	665	660	660	790	775	780	785	770	780
21..	665	665	665	800	790	800	785	780	785
22..	665	665	665	--	--	E 750	800	785	790
23..	665	650	655	--	--	E 650	830	800	820
24..	650	650	650	--	--	E 600	835	830	830
25..	650	650	650	565	550	560	845	830	840
26..	655	620	630	585	555	580	845	840	840
27..	655	655	655	615	585	595	835	825	835
28..	655	650	655	620	615	615	840	825	835
29..	650	650	650	640	620	635	835	825	835
30..	650	650	650	650	640	640	845	835	840
31..	650	650	650	655	650	650	--	--	--

E Estimated.

7-1866. TURKEY CREEK NEAR JOPLIN, MO.

LOCATION.--At gaging station on downstream side of pier of bridge on County Route P, 2.5 miles upstream from mouth, and 3 miles northwest of Joplin, Jasper County.
DRAINAGE AREA.--41.8 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1963 to September 1964.

Chemical analyses, in parts per million, August 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed (unfiltered)
																					Calcium, magnesium	Noncarbonate				
Aug. 28, 1963	--	14	--	0.08	0.00	90	2.8	--	51	20	--	193	0	111	52	0.4	4.1	14	--	461	236	78	650	7.8	10	4
Sept. 17.....	--	5.6	--	.14	.00	90	7.6	--	43	10	--	176	0	120	42	.4	11	14	--	446	256	112	714	8.1	10	6
Oct. 9.....	6.2	11	--	.14	.00	86	6.4	--	50	17	--	188	0	108	45	.6	6.0	22	--	472	241	87	620	7.6	--	4
Oct. 29.....	6.2	10	--	.24	.00	87	6.6	--	64	14	--	211	0	111	67	.4	17	20	--	458	244	71	550	7.9	--	4
Dec. 18.....	8.4	10	0.06	.18	.10	94	6.6	0.05	60	9.6	0.00	226	0	125	58	.1	6.3	7.1	0.03	492	262	76	900	7.8	13	4
Jan. 20, 1964	5.6	8.8	--	.27	.40	96	8.5	--	51	10	--	226	0	132	52	.6	1.9	16	--	480	275	90	800	8.0	10	7
Feb. 9.....	8.4	10	--	.60	.00	101	8.1	--	48	13	--	206	0	156	47	.6	4.4	11	--	519	336	167	825	7.8	12	6
Mar. 9.....	57	4.3	--	.17	.00	72	7.1	--	18	5.3	--	96	0	132	18	.3	11	3.5	--	325	209	130	540	7.9	8	5
Mar. 30.....	16	9.0	.08	.34	.30	127	12	.12	39	7.6	.00	209	0	210	40	.3	26	7.4	.12	610	367	196	810	8.0	5	6
Apr. 20.....	16	9.8	--	.31	.30	130	10	--	31	7.3	--	174	0	225	34	.4	26	11	--	593	366	223	835	8.1	8	5
May 19.....	15	12	--	.25	.00	121	10	--	34	12	--	179	0	204	34	.5	14	9.7	--	565	343	185	760	8.0	6	5
June 9.....	18	12	.07	.21	.00	120	7.1	.14	34	7.9	.01	187	0	176	35	.5	3.2	7.5	.09	509	329	176	750	7.7	10	4
July 9.....	21	10	--	.22	.30	116	7.8	--	28	6.1	--	179	0	181	27	.6	4.6	7.0	--	492	322	175	751	7.8	6	5
Aug. 10.....	26	7.4	--	.12	.00	74	5.7	--	16	6.0	--	117	0	119	18	.4	5.6	2.8	--	327	208	112	450	7.3	18	5
Sept. 11.....	20	14	--	.13	.02	116	7.3	--	34	8.6	--	185	0	174	39	.5	3.6	7.0	--	519	320	168	700	7.3	10	4
Sept. 22.....	22	12	--	.19	.20	99	8.9	--	30	12	--	185	0	153	36	.3	.7	6.7	--	488	284	132	701	7.4	8	3

7-1866. TURKEY CREEK NEAR JOPLIN, MO.--Continued

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Dissolved oxygen		Organics		Organic and ammonia nitrogen (N)	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Temperature
	Parts per million	Percent saturation	Phenols as C_6H_5OH	Detergent (ABS)					
Aug. 28, 1963.....	--	--		2.1	2.8			5	82
Sept. 17.....	11.0	134		3.1	1.1			5	78
Oct. 9.....	3.2	34		1.4	1.5			30	66
Oct. 29.....	10.2	103		1.0	1.7			40	61
Dec. 18.....	9.1	65		3.2	5.4			8	35
Jan. 20, 1964.....	11.2	94		3.7	10			14	46
Feb. 9.....	8.4	69		2.2	5.1			25	48
Mar. 9.....	9.6	75		.4	3.0			30	41
Mar. 30.....	9.9	84		1.8	4.5			20	48
Apr. 20.....	9.8	100		1.7	8.0			10	69
May 19.....	9.2	100		1.1	2.4			3	75
June 9.....	1.0	11		1.0	3.6			10	71
July 9.....	7.7	94		1.2	1.2			25	79
Aug. 10.....	3.4	41		.4	1.6			20	79
Sept. 11.....	2.4	28		.7	1.4			10	73
Sept. 22.....	2.4	28		--	1.4			--	73

Chemical analyses, in parts per million, August 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Chromium		Nickel (Ni)	Copper (Cu)	Lead (Pb)	Zinc (Zn)	Cobalt (Co)	Arsenic (As)	Selenium (Se)	Cadmium (Cd)	Barium (Ba)	Beryllium (Be)	Rubidium (Rb)	Vanadium (V)
		Total Cr	Cr^6												
Oct. 9, 1963.....	6.2	0.00		--	--	0.00	0.21	--				0.00	--	--	--
Oct. 29.....	6.2	.00		--	--	.00	.16	--				.00	--	--	--
Dec. 18.....	8.4	.07		0.02	0.00	.00	1.1	0.00				.02	0.00	0.00	0.00
Mar. 30, 1964.....	16	.00		.03	.02	.00	.29	.00				.06	.00	.01	.00
June 9.....	18	.02		.02	.01	.01	.44	.00				.06	.00	.00	.00

MISCELLANEOUS ANALYSES OF STREAMS IN LOWER MISSISSIPPI RIVER BASIN IN MISSOURI

REMARKS.--Values reported for calcium, magnesium, bicarbonate, carbonate, hardness, specific conductance, pH, dissolved oxygen, ammonia nitrogen, nitrite, and turbidity, are field determinations made by Missouri Water Pollution Board personnel.

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

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Dissolved oxygen		Detergent (ABS)	Ammonia nitrogen (N)	Nitrite (NO_2)	Turbidity
																	Calcium, magnesium	Noncarbonate				Parts per million	Percent saturation				
WHITE RIVER BASIN																											
JAMES RIVER NEAR PALMETTO, MO.																											
Aug. 3, 1964	1.0	11	0.00	0.00	40	9.7	3.1	1.9	143	0	9.2	7.0	0.1	0.9	0.08	154	140	23	290	7.1	2	6.7	88	0.0	0.90	0.00	< 5
PEARSON CREEK NEAR MUMFORD, MO.																											
Aug. 5, 1964	3.5	9.8	0.00	0.00	71	2.9	6.2	1.7	189	0	20	13	1.4	19	0.09	238	190	35	416	8.1	5	8.4	93	0.1	0.35	0.05	< 5
SEQUIOTA CREEK NEAR GALLOWAY, MO.																											
Aug. 4, 1964	0.5	7.9	0.00	0.00	52	4.4	8.8	1.6	164	1	12	13	0.2	7.5	0.08	190	148	11	300	8.3	5	10.1	133	0.1	0.35	0.05	10
JAMES RIVER ABOVE NIXA, MO.																											
Aug. 4, 1964	8.5	9.8	0.00	0.00	61	4.4	4.7	1.9	186	0	21	8.5	0.1	3.1	0.10	207	170	17	361	8.1	3	6.3	78	0.0	0.45	0.02	15
JAMES RIVER NEAR WILSON CREEK, MO.																											
Aug. 5, 1964	12.2	11	0.00	0.01	66	2.4	32	5.2	197	0	21	37	0.4	5.9	0.07	279	176	14	320	8.1	4	8.8	111	0.0	0.70	0.02	15
WILSON CREEK NEAR BATTLEFIELD, MO.																											
Aug. 4, 1964	1.5	15	0.02	0.00	66	2.9	82	15	302	0	52	84	2.2	0.4	27	536	176	0	800	7.9	25	6.7	84	1.6	28	3.6	23
RADERS SPRING AT WILSON CREEK, MO.																											
Aug. 4, 1964		13	0.04	0.00	66	3.4	58	10	269	0	38	60	0.8	3.3	17	419	180	0	650	7.5	20	1.3	15	1.6	11	1.6	22
WILSON CREEK NEAR TERRELL, MO.																											
Aug. 4, 1964	10.5	12	0.09	0.00	72	2.4	56	9.9	247	0	31	63	0.7	8.4	16	410	190	0	722	7.9	15	7.6	95	1.6	10	2.0	13
JAMES RIVER NEAR BOAZ, MO.																											
Aug. 5, 1964	42.6	11	0.01	0.00	68	3.4	31	5.1	211	2	20	36	0.4	0.6	0.16	282	184	7	460	8.3	6	8.8	114	0.3	0.30	0.26	14
FINLEY CREEK NEAR SPARTA, MO.																											
Aug. 20, 1964	8.9	8.7	0.01	0.00	44	10	2.6	1.4	171	0	7.6	4.0	0.0	1.2	0.05	164	152	12	270	8.0	5	7.0	80	0.1	0.35	0.02	5

MISCELLANEOUS ANALYSES OF STREAMS IN LOWER MISSISSIPPI RIVER BASIN IN MISSOURI--Continued

REMARKS.--Values reported for calcium, magnesium, bicarbonate, carbonate, hardness, specific conductance, pH, dissolved oxygen, ammonia nitrogen, nitrite, and turbidity, are field determinations made by Missouri Water Pollution Board personnel.

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

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Dissolved oxygen		Detergent (ABS)	Ammonia nitrogen (N)	Nitrite (NO_2)	Turbidity
																	Calcium, magnesium	Noncarbonate				Parts per million	Percent saturation				
WHITE RIVER BASIN--Continued																											
FINLEY CREEK AT OZARK, MO.																											
Aug. 20, 1964	19.3	11	0.02	0.00	54	6.3	3.4	1.8	178	0	6.8	4.0	0.0	0.0	0.22	175	160	14	300	7.8	5	4.5	52	0.0	0.25	0.05	5
FINLEY CREEK AT RIVERDALE, MO.																											
Aug. 20, 1964	28.6	10	0.02	0.00	56	5.3	3.4	1.6	186	1	6.0	4.0	0.0	3.8	0.13	183	162	8	300	8.3	5	9.0	108	0.0	0.35	0.02	17
CRANE CREEK NEAR GALENA, MO.																											
Aug. 6, 1964	26.3	11	0.00	0.00	54	2.4	2.9	1.2	164	2	4.4	6.5	0.2	7.5	0.06	173	144	5	255	8.5	5	9.9	125	0.0	0.35	0.05	6
JAMES RIVER NEAR GALENA, MO.																											
Aug. 5, 1964	99.5	10	0.00	0.00	61	3.9	13	2.8	193	3	10	17	0.2	4.6	1.5	223	168	5	325	8.5	5	11.8	153	0.1	0.55	0.02	8
JAMES RIVER BELOW GALENA, MO.																											
Aug. 6, 1964	87.3	8.2	0.00	0.00	61	4.4	12	2.8	197	8	11	15	0.2	1.2	1.2	222	170	0	320	9.0	10	10.9	136	0.1	0.10	0.02	13
FLAT CREEK NEAR CASSVILLE, MO.																											
Aug. 19, 1964	5.9	9.4	0.01	0.00	54	1.9	4.4	1.2	156	1	4.2	7.0	0.0	6.2	0.25	167	142	12	260	8.3	5	9.4	110	0.2	0.20	0.03	6
STROTHER CREEK NEAR OATES, MO.																											
Mar. 16, 1964[A]		6.5	0.02	0.00	22	13	0.9	0.6	122	0	5.6	0.5	0.0	0.7	0.00	109	109	8	207	8.2				0.0			
BRUSHY CREEK NEAR OATES, MO.																											
Mar. 16, 1964[B]		5.9	0.02	0.00	12	7.1	0.8	0.6	64	0	6.0	2.0	0.0	2.3	0.00	68	59	6	129	7.9				0.0			
7-613. EAST FORK BLACK RIVER AT LESTERVILLE, MO.																											
May 13, 1964		7.3	0.03	0.00	16	8.4	1.5	1.3	85	0	6.4	1.8	0.2	0.1		85	74	5	157	7.6	10						
June 15.....		7.8	.09	.00	16	8.6	1.8	1.6	89	0	6.4	.8	.2	.2		87	76	2	162	7.3	30						

A Includes chromium (Cr) 0.00, copper (Cu) 0.01, lead (Pb) 0.02, zinc (Zn) 0.05, cobalt (Co) 0.00, cadmium (Cd) 0.0.
B Includes chromium (Cr) 0.00, copper (Cu) 0.01, lead (Pb) 0.01, zinc (Zn) 0.05, cobalt (Co) 0.00, cadmium (Cd) 0.0.

MISCELLANEOUS ANALYSES OF STREAMS IN LOWER MISSISSIPPI RIVER BASIN IN MISSOURI--Continued

REMARKS.--Values reported for calcium, magnesium, bicarbonate, carbonate, hardness, specific conductance, pH, dissolved oxygen, ammonia nitrogen, nitrite, and turbidity, are field determinations made by Missouri Water Pollution Board personnel.

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

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Dissolved oxygen		Detergent (ABS)	Ammonia nitrogen (N)	Nitrite (NO_2)	Turbidity
																	Calcium, magnesium	Noncarbonate				Parts per million	Percent saturation				
ARKANSAS RIVER BASIN																											
SPRING RIVER AT VERONA, MO.																											
Sept. 14,1964	4.6	9.4	0.04	0.00	58	1.9	4.3	0.9	176	0	2.8	8.0	0.1	9.8	0.28	182	153	9	280	7.9	2	11.5	128	0.0	0.35	0.05	7
SPRING RIVER NEAR VERONA, MO.																											
Sept. 14,1964	5.0	9.1	0.03	0.00	52	1.9	4.2	1.0	164	0	4.2	8.0	0.1	5.4	0.26	168	138	3	260	8.2	4	10.3	124	0.1	0.70	0.03	9
7-1856.5. SPRING RIVER NEAR STOTTS CITY, MO.																											
Sept. 15,1964	48.5	8.5	0.00	0.00	56	2.4	6.0	1.3	178	0	7.8	8.0	0.0	8.6	0.20	187	150	4	300	7.5	5	8.6	90	0.0	0.35	0.02	19
SPRING RIVER AT FOREST MILLS, MO.																											
Sept. 15,1964	52.6	10	0.04	0.00	57	2.4	5.3	1.3	182	0	7.2	6.0	0.0	6.4	0.16	186	153	4	300	7.8	5	8.8	96	0.0	0.35	0.02	19
SPRING RIVER AT CARTHAGE, MO.																											
Sept. 15,1964	A58	9.1	0.00	0.00	57	2.4	6.2	1.5	182	0	8.8	8.0	0.0	5.2	0.55	189	153	4	300	8.0	5	9.4	107	0.1	0.70	0.05	24
SPRING RIVER AT GALESBURG, MO.																											
Sept. 15,1964	67.0	9.2	0.02	0.00	57	1.7	6.4	1.7	182	0	10	8.0	0.0	4.0	0.54	189	150	1	300	7.9	6	9.0	102	0.1	0.35	0.02	14
NORTH FORK SPRING RIVER AT GEORGIA CITY, MO.																											
Sept. 16,1964	A2	6.6	0.38	0.00	26	4.4	3.8	3.4	85	0	2.1	0.1	0.2	0.2	0.20	109	83	13	170	7.6	10	9.0	102	0.0	0.55	0.05	60
7-1860. SPRING RIVER NEAR WACO, MO.																											
Sept. 15,1964		8.8	0.00	0.00	55	3.6	6.8	1.8	173	0	11	9.0	0.1	3.1	0.19	186	153	11	300	8.1	5	9.0	103	0.1	0.80	0.03	19
Sept. 22.....		10	.12	.00	53	4.1	6.7	1.9	170	0	11	14	0.0	2.7	0.42	190	149	10	309	7.8	3	6.2	71		1.8		
CENTER CREEK AT SARCOXIE, MO.																											
Sept. 1, 1964	17.1	10	0.04	0.00	52	1.9	3.7	1.0	138	0	3.2	4.0	0.0	5.5	0.04	150	138	25	250	8.0	25	7.8	89	0.0	0.25	0.02	18

A Estimated.

REMARKS.--Values reported for calcium, magnesium, bicarbonate, carbonate, hardness, specific conductance, pH, dissolved oxygen, ammonia nitrogen, nitrite, and turbidity, are field determinations made by Missouri Water Pollution Board personnel.

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

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Dissolved oxygen		Detergent (ABS)	Ammonia nitrogen (N)	Nitrite (NO_2)	Turbidity
																	Calcium, magnesium	Noncarbonate				Parts per million	Percent saturation				
ARKANSAS RIVER BASIN--Continued																											
CENTER CREEK NEAR FIDELITY, MO.																											
Sept. 1, 1964	34.2	9.0	0.00	0.00	50	3.2	3.6	1.4	156	0	5.6	3.0	0.0	3.4	0.06	156	138	10	240	8.1	7	7.8	94	0.0	0.35	0.02	22
GROVE CREEK NEAR ATLAS, MO.																											
Aug. 5, 1964[A]		185	0.00	2.7	206	11	55	5.8	0	0	554	36	136	48	37	1400	560	560	2140	3.2	8				69		
CENTER CREEK AT LAKESIDE, MO.																											
Sept. 2, 1964	40.7	28	0.03	0.01	68	7.3	13	2.5	83	0	92	10	28	48	16	368	200	132	520	7.3	9	6.6	80	0.2	10	1.0	5
CENTER CREEK AT ORONOGO, MO.																											
Sept. 2, 1964	50.4	20	0.00	0.7	78	5.6	11	2.4	88	0	118	9.0	17	36	19	374	218	146	550	7.3	5	6.2	76	0.2	10	1.0	5
CENTER CREEK NEAR SMITHFIELD, MO.																											
Sept. 2, 1964	54.8	17	0.00	0.01	101	3.9	12	2.4	66	0	175	9.0	13	42	9.3	425	268	214	600	7.6	5	8.6	110	0.2	4.5	2.0	11
Sept. 22[B]	32.0	29	.06	.4	124	11	18	2.4	32	0	248	19	21	87	12	604	355	329	868	6.6	5	4.7	54		12		
SHOAL CREEK AT JOPLIN, MO.																											
Sept. 3, 1964	125	10	0.03	0.00	47	2.4	4.5	1.7	173	8	9.6	5.0	0.0	0.1	0.48	174	128	0	240	8.7	5	7.8	95	0.1	0.35	0.02	15
BIG SUGAR CREEK AT POWELL, MO.																											
Aug. 17, 1964	8.5	11	0.01	0.00	48	1.4	2.6	1.4	151	0	7.8	4.0	0.0	1.9	0.07	153	126	2	230	8.2	5	10.3	126	0.0	0.35	0.00	<5
LITTLE SUGAR CREEK AT CAVERNA, MO.																											
Aug. 17, 1964	6.6	13	0.01	0.00	53	1.0	5.8	2.0	162	0	5.0	8.0	0.0	0.4	0.12	168	136	3	240	7.9	5	7.8	92	0.0	0.25	0.00	6

A Includes aluminum (Al) 9.1, immediate acidity (H) 7.4, copper (Cu) 0.47, lead (Pb) 0.02, and zinc (Zn) 8.4.
B Includes oxygen consumed (unfiltered) 2, phenolic material (C_6H_5OH) 0.000, organic nitrogen (N) 0.67, and threshold odor 2.

MISCELLANEOUS ANALYSES OF STREAMS IN LOWER MISSISSIPPI RIVER BASIN IN MISSOURI--Continued

REMARKS.--Values reported for calcium, magnesium, bicarbonate, carbonate, hardness, specific conductance, pH, dissolved oxygen, ammonia nitrogen, nitrite, and turbidity, are field determinations made by Missouri Water Pollution Board personnel.

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

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Dissolved oxygen		Detergent (ABS)	Ammonia nitrogen (N)	Nitrite (NO_2)	Turbidity
																	Calcium, magnesium	Noncarbonate				Parts per million	Percent saturation				
ARKANSAS RIVER BASIN--Continued																											
7-1888.5. ELK RIVER AT PINEVILLE, MO.																											
Aug. 19, 1964	34.9	12	0.02	0.00	51	2.9	3.2	1.5	164	0	6.8	4.0	0.0	2.0	0.05	164	140	5	260	8.1	5	8.6	104	0.0	0.35	0.02	7
7-1888.7. INDIAN CREEK AT ANDERSON, MO.																											
Aug. 18, 1964	44.2	11	0.00	0.00	45	2.4	2.9	1.2	136	0	3.4	3.0	0.0	4.8	0.09	141	122	10	220	8.2	5	9.8	118	0.0	0.25	0.00	8
INDIAN CREEK AT LANAGAN, MO.																											
Aug. 18, 1964	46.8	11	0.02	0.00	46	1.9	3.3	1.3	124	0	4.0	5.0	0.0	2.9	0.14	137	124	22	230	8.1	3	9.0	110	0.0	0.45	0.02	17
ELK RIVER NEAR LANAGAN, MO.																											
Aug. 19, 1964		11	0.00	0.00	48	2.9	3.3	1.5	147	0	6.2	4.0	0.0	2.5	0.09	152	132	11	240	8.0	5	8.2	96	0.0	0.25	0.00	5
7-1891. BUFFALO CREEK AT TIFF CITY, MO.																											
Aug. 18, 1964	8.8	12	0.00	0.00	50	1.0	4.2	1.5	149	0	6.8	6.0	0.0	3.1	0.02	158	128	6	250	7.6	4	7.4	84	0.0	0.25	0.00	7

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