DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 433

SURFACE WATER SUPPLY OF THE UNITED STATES

1916

PART III. OHIO RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
ALBERT H. HORTON and WARREN E. HALL, District Engineers

Prepared in cooperation with
THE STATES OF ILLINOIS AND KENTUCKY

WASHINGTON
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SURFACE WATER SUPPLY OF OHIO RIVER BASIN, 1916.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1916.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1886 in connection with special studies relating to irrigation in the arid west. Since the fiscal year ending June 30, 1895, successive sundry bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ended June 30, 1895–1917.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1917, inclusive	150,000

In the execution of the work many private and State organizations have cooperated either by furnishing data or by assisting in collecting data. Acknowledgements for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 14.

Measurements of stream flow have been made at about 4,100 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1916, 1,290 gaging stations were being maintained by the Survey and the cooperating organizations.

Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth of inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, acre-feet, and millions of cubic feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the tables of convenient equivalents (p. 9).

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth of inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

"Millions of cubic feet" is applied to quantities of water stored in reservoirs, most frequently in connection with studies of flood control.

The following terms not in commom use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a given gaging station is that point on the gage—the gage height—to which the surface of the river would fall if there were no flow.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge (second-feet per square mile).	Run-off (depth in inches).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.03719	1.041	1,079	1.116	1.153
2	.07438	2.083	2.157	2.231	2.306
3	.11157	3.124	3.236	3.347	3.459
4	.14876	4.165	4.314	4.463	4.612
5	.18595	5.207	5.393	5.578	5.764
6	.22314	6.248	6.471	6.694	6.917
7	.26033	7.289	7.550	7.810	8.070
8	.29752	8.331	8.628	8.926	9.223
9	.33471	9.372	9.707	10.041	10.376

NOTE.—For part of a month multiply the run-off for one day by number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge (second-feet).	Run-off (acre-feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	1.983	55.54	57.52	59.50	61.49
2	3.967	111.1	115.0	119.0	123.0
3	5.950	166.6	172.6	178.5	184.5
4	7.934	222.1	230.1	238.0	246.0
5	9.917	277.7	287.6	297.5	307.4
6	11.90	333.2	345.1	357.0	368.9
7	13.88	388.8	402.6	416.5	430.4
8	15.87	444.3	460.2	476.0	491.9
9	17.85	499.8	517.7	535.5	553.4

NOTE.—For part of a month multiply the run-off for one day by the number of days.

Table for converting discharge in second-feet into run-off in millions of cubic feet.

Discharge (second-feet).	Run-off (millions of cubic feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.0864	2.419	2.506	2.592	2.678
2	.1728	4.838	5.012	5.184	5.356
3	.2592	7.257	7.518	7.776	8.034
4	.3456	9.676	10.024	10.368	10.712
5	.4320	12.095	12.530	12.960	13.390
6	.5184	14.514	15.036	15.552	16.068
7	.6048	16.933	17.542	18.144	18.746
8	.6912	19.352	20.048	20.736	21.424
9	.7776	21.771	22.554	23.328	24.102

NOTE.—For part of a month multiply the run-off for one day by the number of days.

Table for converting discharge in second-feet into run-off in millions of gallons.

Discharge (second-feet).	Run-off (millions of gallons).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.6463	18.10	18.74	19.39	20.04
2	1.293	36.20	37.48	38.78	40.08
3	1.939	54.30	56.22	58.17	60.12
4	2.585	72.40	74.96	77.56	80.16
5	3.232	90.50	93.70	96.95	100.2
6	3.878	108.6	112.4	116.3	120.2
7	4.524	126.7	131.2	135.7	140.3
8	5.171	144.8	149.9	155.1	160.3
9	5.817	162.9	168.7	174.5	180.4

NOTE.—For part of a month multiply the run-off for one day by the number of days.

Table for converting velocity in feet per second into velocity in miles per hour.

[1 foot per second=0.681618 mile per hour, or two-thirds mile per hour, very nearly; 1 mile per hour=1.4666 feet per second. In computing the table the figures 0.68182 and 1.4667 were used.]

Feet per second (units).	Miles per hour for tenths of foot per second.									
	0	1	2	3	4	5	6	7	8	9
0	0.000	0.068	0.136	0.205	0.273	0.341	0.409	0.477	0.545	0.614
1	.682	.750	.818	.886	.995	1.02	1.09	1.16	1.23	1.30
2	1.36	1.43	1.50	1.57	1.64	1.70	1.77	1.84	1.91	1.98
3	2.05	2.11	2.18	2.25	2.32	2.39	2.45	2.52	2.59	2.66
4	2.73	2.80	2.86	2.93	3.00	3.07	3.14	3.20	3.27	3.34
5	3.41	3.48	3.55	3.61	3.68	3.75	3.82	3.89	3.95	4.02
6	4.09	4.16	4.23	4.30	4.36	4.43	4.50	4.57	4.64	4.70
7	4.77	4.84	4.91	4.98	5.05	5.11	5.18	5.25	5.32	5.39
8	5.45	5.52	5.59	5.66	5.73	5.80	5.86	5.93	6.00	6.07
9	6.14	6.20	6.27	6.34	6.41	6.48	6.55	6.61	6.68	6.75

Table for converting discharge in second-feet into theoretical horsepower per foot of fall.

[1 second-foot=0.1136 theoretical horsepower per foot of fall. Weight of 1 cubic foot of water=62.5 pounds.]

Tens.	Units.									
	0	1	2	3	4	5	6	7	8	9
0	0.00	0.114	0.227	0.341	0.454	0.568	0.682	0.795	0.909	1.02
1	1.14	1.25	1.36	1.48	1.59	1.70	1.82	1.93	2.04	2.16
2	2.27	2.39	2.50	2.61	2.73	2.84	2.95	3.07	3.18	3.29
3	3.41	3.52	3.64	3.75	3.86	3.98	4.09	4.20	4.32	4.43
4	4.54	4.66	4.77	4.88	5.00	5.11	5.23	5.34	5.45	5.57
5	5.68	5.79	5.91	6.02	6.13	6.25	6.36	6.48	6.59	6.70
6	6.82	6.93	7.04	7.16	7.27	7.38	7.50	7.61	7.72	7.84
7	7.95	8.07	8.18	8.29	8.41	8.52	8.63	8.75	8.86	8.97
8	9.09	9.20	9.32	9.43	9.54	9.66	9.77	9.88	10.0	10.1
9	10.2	10.3	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2

1 second-foot equals 40 California miner's inches (law of March 23, 1901).

1 second-foot equals 38.4 Colorados miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year (365 days) covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year (365 days) equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1915, and ending September 30, 1916. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to gage heights, give the discharge from which the daily, monthly, and yearly mean discharge is determined.

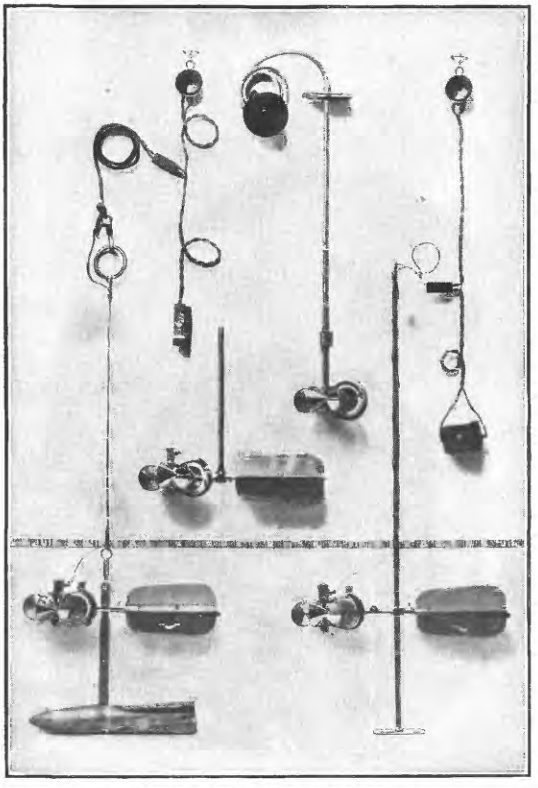
The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage heights and results of discharge measurements are published.

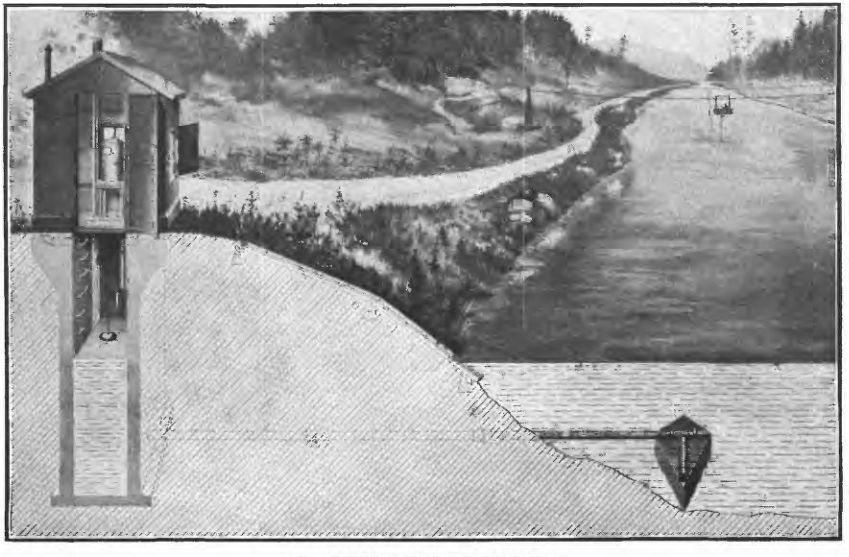
The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the constancy of the discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day, or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

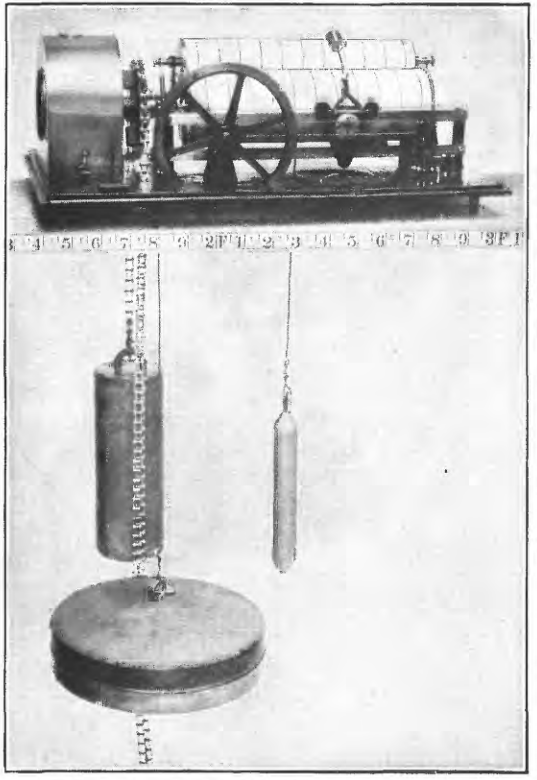
In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger



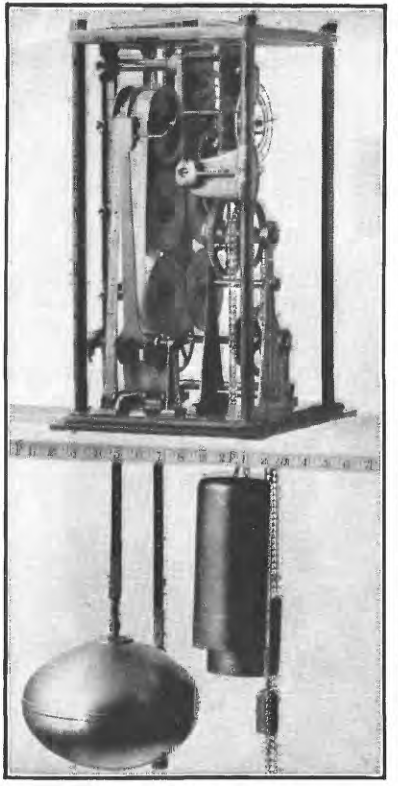
A. PRICE CURRENT METERS.



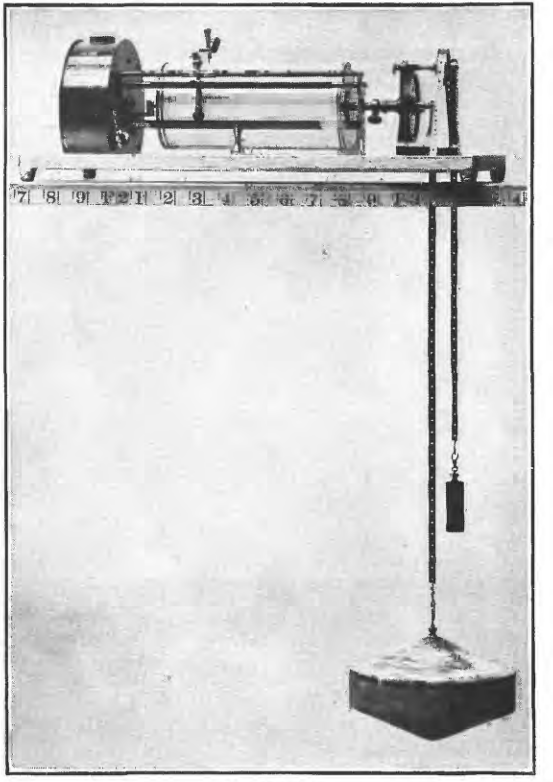
B. TYPICAL GAGING STATION.



A. STEVENS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on pages 13 and 14, are based.

The deficiency table presented for some of the gaging stations shows the number of days in each year on which the mean daily discharge was less than the discharge given in the table. By subtraction the table gives the number of days each year that the mean daily discharge was between the discharges given in the table and, also by subtraction, the number of days that the mean daily discharge was equal to or greater than the discharge given. If one discharge rating table was used throughout the period covered by the deficiency table, gage heights that correspond to the discharges are also given. For convenience the theoretical horsepower per foot of fall corresponding to the discharge is given in the Table on page 10. In using the table for studies of power, allowance should be made for the various losses, the most important being wheel loss and head loss.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station or footnotes added to the tables gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage heights to the rating table to obtain the daily discharge.[1]

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of infor-

[1] For a more detailed discussion of the accuracy of stream-flow data see Grover, N. C., and Hoyt, J. C., Accuracy of stream-flow data: U. S. Geol. Survey Water-Supply Paper 400, pp. 53–59, 1916.

mation concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "Run-off (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

Work in Illinois during the year was carried on in cooperation with the State of Illinois Rivers and Lakes Commission.

Work in Kentucky was done in cooperation with the State Geological Survey, J. B. Hoeing, State geologist.

The United States Engineer Corps cooperated in maintaining 8 stations in the basin and furnished base data for 30 additional stations.

Special acknowledgments are due for financial assistance rendered by the Alabama Geological Survey, the Tennessee Power Co., the United States Army Engineers, and Mr. H. F. Van Deventer.

DIVISION OF WORK.

Data for Allegheny River at Red House, N. Y., were collected and prepared for publication under the direction of C. C. Covert, district engineer, assisted by O. W. Hartwell and C. D. Burchard.

Data for other stations in the basin, except those in Illinois, and for the basin of Tennessee River, were collected and prepared for publication under the direction of A. H. Horton, district engineer, assisted by B. E. Jones, B. J. Peterson, William Kessler, J. C. Dort, and Lasley Lee.

Data for stations in Illinois were collected and prepared for publication under direction of W. G. Hoyt, district engineer, assisted by H. C. Beckman.

Data for stations in the Tennessee River basin were collected and prepared for publication under the direction of Warren E. Hall, district engineer, assisted by L. J. Hall and B. M. Hall, Jr.

The records were assembled and reviewed by A. H. Horton, B. E. Jones, and B. J. Peterson.

Daily discharge, in second-feet, of Allegheny River at Red House, N. Y., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	635	685	3,780	11,700	4,270	1,610	30,000	5,410	3,400	1,050	405	254
2	738	790	3,090	12,100	4,520	1,540	28,400	4,340	3,400	930	405	278
3	2,110	738	2,290	14,600	4,270	1,460	24,000	4,090	4,860	930	345	254
4	1,380	905	1,860	10,600	3,780	1,460	20,300	4,340	9,300	2,050	330	265
5	3,310	905	1,770	10,300	3,310	1,540	14,100	3,850	8,600	1,580	298	278
6	6,400	905	1,310	17,800	1,460	1,610	10,800	3,400	6,900	1,170	330	298
7	5,030	685	1,610	12,500	1,610	1,690	8,600	2,590	6,000	1,110	330	317
8	3,310	685	1,380	11,000	2,110	1,940	6,600	2,400	5,130	930	330	495
9	2,880	685	1,460	7,290	1,940	2,880	5,410	2,400	4,860	810	330	595
10	2,680	635	1,540	5,830	1,770	10,600	4,860	2,220	6,600	648	278	595
11	1,940	685	1,160	4,520	1,460	8,230	4,600	1,890	7,200	495	265	423
12	1,610	905	1,160	4,770	1,240	7,290	6,000	1,810	10,400	477	265	330
13	1,460	1,100	1,160	4,520	1,100	6,110	7,900	1,580	10,000	1,580	265	330
14	1,310	1,030	1,310	4,520	1,030	5,560	12,400	1,300	8,950	2,980	298	317
15	3,540	1,030	1,240	3,540	968	4,770	18,300	1,970	9,300	1,730	265	330
16	3,780	1,160	1,240	3,780	905	4,020	19,800	4,340	10,000	1,580	265	330
17	4,020	1,030	1,460	3,540	848	3,780	13,200	22,400	9,300	1,300	265	330
18	3,310	1,610	3,540	4,020	848	3,540	10,000	24,600	7,900	1,110	265	345
19	4,270	1,610	7,600	4,270	848	3,310	8,950	11,600	8,600	930	265	330
20	4,520	4,270	5,560	4,020	848	3,310	7,550	7,550	9,650	810	265	345
21	3,780	4,770	3,780	4,270	848	3,310	7,900	6,600	9,300	700	238	390
22	3,540	4,270	3,540	4,770	848	3,090	12,800	5,700	7,900	700	254	345
23	2,680	4,520	2,880	6,990	905	3,310	17,800	6,000	5,410	648	265	298
24	1,770	4,270	2,880	5,830	1,100	3,310	17,300	5,700	4,090	595	254	317
25	1,690	4,770	2,880	4,270	1,610	3,540	14,100	4,340	2,780	595	238	298
26	1,380	4,520	7,910	4,270	1,770	3,780	12,000	5,130	2,780	495	238	330
27	1,460	4,770	6,990	4,270	1,860	12,500	8,950	4,340	2,050	405	221	317
28	1,610	5,290	5,830	4,520	1,860	25,600	7,900	4,090	1,730	370	221	278
29	1,380	5,030	6,400	4,020	1,770	31,800	7,900	3,850	1,580	370	265	298
30	1,160	4,770	8,230	4,520	.....	34,200	6,300	3,620	1,440	390	238	265
31	905	.....	11,000	4,270	.....	31,800	.....	3,620	.....	400	221	.....

NOTE.—Discharge, Feb. 13 to Mar. 27, estimated, because of ice, from one measurement, weather records, study of gage-height graph, and comparison with adjacent streams. New rating used beginning Apr. 1.

Monthly discharge of Allegheny River at Red House, N. Y., for the year ending Sept. 30, 1916.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	6,400	635	2,570	1.57	1.81
November	5,290	635	2,300	1.40	1.56
December	11,000	1,160	3,480	2.12	2.44
January	17,800	3,540	6,680	4.07	4.69
February	4,520	848	1,780	1.09	1.18
March	34,200	1,460	7,500	4.57	5.27
April	30,000	4,600	12,500	7.62	8.50
May	24,600	1,300	5,390	3.29	3.79
June	10,400	1,440	6,310	3.85	4.30
July	2,980	370	965	.588	.68
August	405	221	281	.171	.20
September	595	254	339	.207	.23
The year	34,200	221	4,170	2.54	34.65

MONONGAHELA RIVER BASIN.

TYGART RIVER NEAR DAILEY, W. VA.

LOCATION.—At Burnt Bridge, on Staunton-Parkersburg Pike, 1 mile northeast of Dailey, Randolph County, 2 miles south of Beverly, on Western Maryland Railway, 1,000 feet above Stalnaker Run, which enters on right above control.

GAGING-STATION RECORDS.

ALLEGHENY RIVER BASIN.

ALLEGHENY RIVER AT RED HOUSE, N. Y.

LOCATION.—At highway bridge in Red House, Cattaraugus County, about 5 miles below Salamanca and 13 miles above the boundary between New York and Pennsylvania. Conewango Creek, the outlet of Chautauqua Lake, enters the Allegheny in Pennsylvania about 30 miles below the station.

DRAINAGE AREA.—1,640 square miles.

RECORDS AVAILABLE.—September 4, 1903, to September 30, 1916.

GAGE.—Chain, attached to the upstream side of bridge near left hand end; read by W. E. Coe.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Coarse gravel, occasionally shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.65 feet at 6.30 p. m., March 29 (discharge approximately 35,700 second-feet). Minimum stage recorded 3.1 feet at 3 p. m. August 27 and at 6 a. m. August 28 and 31 (discharge, 210 second-feet).

1903–1916: Maximum stage recorded 12.7 feet March 26, 1913 (discharge approximately 40,000 second-feet); minimum stage recorded, 2.7 feet several days in December, 1908 (discharge approximately 100 second-feet).

ICE.—Stage-discharge relation somewhat affected by ice.

REGULATION.—Low water flow may be slightly affected by the operation of several small power plants above Salamanca. At Olean a wasteway from Cuba reservoir enters the river through Olean Creek. This reservoir is on the divide between Oil Creek, tributary to Allegheny River, and Genesee River, tributary to Lake Ontario. The stored water is commonly turned into Genesee River through the abandoned summit level of Genesee River canal, or may be diverted into Oil Creek through a guard lock at the head of the canal.

ACCURACY.—Stage-discharge relation changed during high water April 1, 1916. Rating curve used before April 1 well defined between 300 and 15,000 second-feet and fairly well defined between 15,000 and 30,000 second-feet. Curve used after April 1 well defined between 300 and 900 second-feet and between 6,000 and 13,000 second-feet. Stage discharge relation affected by ice during most of February and March. Gage read to half tenths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Results fair for periods when the stage-discharge relation was affected by ice; good for other periods.

Discharge measurements of Allegheny River at Red House, N. Y., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 16	C. C. Covert	7.58	4,160	July 24	E. D. Burchard	3.69	740
May 20	E. D. Burchard	6.89	7,460	Sept. 11	do	3.44	434
20	do	6.71	6,990	Sept. 12	do	3.30	335

TYGART RIVER AT BELINGTON, W. VA.

LOCATION.—At highway bridge at Belington, Barbour County, one-fourth mile above mouth of Mill Creek.

DRAINAGE AREA.—390 square miles.

RECORDS AVAILABLE.—June 5, 1907, to September 30, 1916.

GAGE.—Chain gage on upstream side of highway bridge to left of center of river; read by S. A. Campbell. Zero of gage, 1,679.89 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from upstream side of the bridge.

CHANNEL AND CONTROL.—Practically permanent; straight above and below.

EXTREMES OF DISCHARGE.—Maximum stage recorded during 1916, 13.7 feet at 7 a. m. January 12 (discharge, 9,920 second-feet); minimum stage, 1.93 feet August 28, 1916 (discharge, 10 second-feet). Flood of July, 1912, reached gage height 20.3 feet.

ICE.—Ice may affect stage-discharge relation for two or three weeks at a time during December, January, and February.

ACCURACY.—Stage-discharge relation practically permanent; apparently not affected by ice during 1913, 1914, and 1915. Daily discharge October 1, 1913, to September 30, 1916, determined from rating curve well defined between 300 and 4,000 second-feet, fairly well defined 25 to 300 second-feet; beyond these limits curve is extension. Gage read daily in the morning to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

Discharge measurements of Tygart River at Belington, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 17.	B. E. Jones	5.60	1,620
24.	do	6.92	2,600
Sept. 13.	L. Lee	2.36	45

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for the years ending Sept. 30, 1914–1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	86	490	590	672	1,060	515	1,200	1,000	43	91	116	815
2	82	440	166	565	1,550	590	2,350	540	55	84	91	418
3	116	318	820	440	880	1,060	4,830	395	42	38	75	395
4	515	270	700	372	790	1,200	3,550	226	37	42	73	395
5	418	212	590	440	760	1,130	1,620	540	72	40	61	65
6	255	179	540	418	940	940	1,060	3,640	110	34	41	35
7	195	166	1,000	395	1,760	850	760	2,270	97	70	34	27
8	160	155	2,830	372	1,200	790	645	1,550	88	67	25	38
9	124	1,410	1,900	1,060	1,200	700	590	1,000	56	38	20	28
10	940	2,190	1,270	3,010	1,000	590	1,830	208	110	65	34	25
11	790	1,620	940	2,270	700	618	1,690	185	36	22	23	26
12	395	1,340	590	1,340	490	645	1,620	91	33	18	72	27
13	133	1,620	590	820	880	490	1,550	395	26	17	263	27
14	372	6,690	540	1,060	2,270	440	1,130	342	26	27	240	26
15	169	10,300	515	2,190	1,970	1,760	645	263	28	1,760	155	24
16	166	10,600	465	1,970	1,830	3,550	3,100	255	48	2,510	116	17
17	169	8,940	440	1,620	1,830	4,430	4,230	202	31	1,200	95	17
18	166	3,190	418	1,270	1,970	3,460	4,030	179	24	490	34	17
19	146	2,510	350	1,130	4,130	2,270	3,550	160	24	372	43	17
20	128	1,060	395	565	8,700	1,480	4,430	144	24	270	37	17
21	3,460	850	395	4,430	3,550	1,000	5,260	131	20	185	28	17
22	1,620	540	395	4,430	2,510	1,830	2,040	116	15	119	23	10
23	1,060	490	395	2,510	1,270	590	1,620	15	32	82	22	10
24	880	440	372	1,270	1,060	730	880	116	126	67	20	12
25	3,640	418	490	4,330	618	1,550	645	89	395	58	131	8
26	2,670	286	2,670	2,670	1,000	1,690	4,930	88	1,340	490	182	8
27	2,350	240	2,430	1,760	540	1,760	3,730	79	490	1,340	240	8
28	1,480	350	1,480	1,340	515	1,690	2,270	61	350	1,330	233	7
29	880	418	1,000	1,130	.....	1,760	1,620	55	17	700	149	8
30	618	318	850	1,060	.....	1,760	1,270	42	8	298	114	7
31	490	.....	820	1,060	.....	1,340	.....	42	.....	185	318	.....

DRAINAGE AREA.—194 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 20, 1915, to September 30, 1916.

GAGE.—Vertical staff on face of right abutment of bridge near downstream end; read by Charles W. Chenoweth.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Stay wire is used for measurements at high stages. Flow of Stalnaker Run is included.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and 1,300 feet below bridge. Right bank high and clean; left bank low; large overflow through meadows at high stages. Stream bed is rocky, but banks are sandy. Control probably permanent. Point of zero flow, September 16, 1915, at gage height 0.2 foot ±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.3 feet at 5 p. m., December 18; minimum stage, 0.6 foot at 7 a. m., December 4. Highest known flood reached a stage represented approximately by gage height 16 feet.

ICE.—Stage-discharge relation affected by ice at times.

ACCURACY.—Stage-discharge relation probably permanent; affected by ice during December, January, and February. Rating curve not yet developed. Gage read twice daily to half tenths.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

The following discharge measurements were made by J. E. Stewart and L. Lee, respectively:

March 24, 1916: Gage height, 3.80 feet; discharge, 886 second-feet.

September 16, 1916: Gage height, 3.20 feet; discharge, 580 second-feet.

Daily gage height, in feet, of Tygart River near Dailey, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.30	1.12	0.85	3.25	4.55	2.25	2.85	2.72	2.25	1.55	1.28	0.95
2	4.32	1.10	.78	7.35	4.25	2.58	2.45	2.90	2.05	1.35	1.22	.90
3	3.00	1.18	.68	4.32	3.45	2.72	2.62	2.92	2.45	4.92	1.15	.90
4	2.40	1.15	.70	3.18	2.82	2.65	2.62	2.78	2.30	2.82	1.10	1.00
5	2.05	1.10	1.55	2.75	2.65	2.55	2.32	2.55	2.10	2.10	1.95	.98
6	1.88	1.10	1.60	3.38	2.62	2.95	2.22	2.28	2.05	1.80	2.28	.92
7	1.72	1.38	1.50	3.40	4.15	6.95	2.08	2.28	1.90	1.60	2.15	.88
8	1.58	1.32	1.40	2.85	3.88	6.78	2.08	2.38	1.88	1.42	1.52	.98
9	1.48	1.26	1.50	2.85	2.28	3.98	2.10	2.29	1.92	1.36	1.98	1.05
10	1.42	1.18	1.48	2.50	3.15	3.26	2.05	2.18	1.88	1.35	1.82	1.22
11	1.38	1.12	1.40	7.35	2.90	2.78	2.12	2.05	1.85	1.22	1.90	1.22
12	1.30	1.10	1.60	7.08	3.80	2.55	3.08	1.92	1.82	1.28	2.75	1.12
13	1.22	1.18	1.60	4.79	7.15	2.56	3.18	1.82	1.60	1.38	2.45	.98
14	1.20	1.42	1.55	4.08	4.42	4.75	2.92	1.88	1.48	1.95	2.15	.82
15	1.19	4.62	1.48	3.60	3.38	6.72	2.88	1.70	1.68	2.05	1.88	6.35
16	1.05	4.42	1.75	2.85	1.88	4.05	2.68	2.30	1.88	1.65	1.82	3.32
17	1.10	2.70	5.00	2.75	2.58	3.42	2.55	2.52	1.85	1.50	2.15	2.65
18	1.05	2.40	9.30	1.20	2.40	2.82	3.20	2.35	1.80	1.62	1.78	1.75
19	5.05	2.38	6.10	2.30	2.38	2.65	2.80	2.05	1.72	1.52	1.52	1.55
20	3.25	3.32	3.50	2.40	2.42	2.30	2.52	1.88	1.80	1.40	1.48	1.42
21	2.62	3.31	2.88	3.50	2.72	2.32	2.20	1.70	1.88	1.42	1.40	1.35
22	2.45	3.25	2.45	3.55	2.72	6.18	2.25	1.88	2.05	2.80	1.35	1.42
23	2.38	3.18	2.28	3.85	2.66	5.92	2.25	1.78	1.88	1.92	1.40	1.32
24	2.25	3.12	2.10	3.30	2.60	4.00	2.12	1.75	1.80	1.80	1.35	1.20
25	2.12	2.58	2.10	2.82	2.88	3.15	3.75	1.68	3.10	1.55	1.20	1.15
26	2.12	1.07	2.82	2.48	2.75	2.78	4.58	5.05	3.32	1.52	1.10	1.08
27	1.90	1.02	2.60	2.30	2.70	2.72	4.32	3.75	2.15	1.45	1.10	1.00
28	1.68	1.00	3.00	2.18	2.80	3.38	3.95	3.52	1.98	2.28	1.18	1.00
29	1.48	1.00	5.85	2.38	2.40	3.80	3.42	2.90	1.85	1.72	1.12	4.15
30	1.35	.92	5.55	4.92	.....	3.40	2.78	2.50	1.65	1.48	1.00	3.40
31	1.22	.....	3.75	3.98	.....	3.10	.....	3.45	.....	1.30	.98	.....

NOTE.—Observer reports ice at gage during parts of December, January, and February.

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for the years ending Sept. 30, 1914–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	8	56	30	1,340	1,620	672	490	1,340	1,900	40	95	240
2	3	58	41	820	7,620	590	418	940	760	22	95	166
3	10	56	124	730	7,620	490	372	590	700	49	240	124
4	10	51	166	820	4,230	440	342	465	700	27	274	67
5	10	40	240	350	2,110	372	310	395	760	36	114	72
6	6	34	565	270	1,556	760	270	330	490	49	418	91
7	15	31	540	2,670	1,340	790	334	270	395	41	61	82
8	8	30	565	5,480	1,060	700	700	240	314	94	59	89
9	8	32	672	1,830	1,060	790	590	212	270	59	51	95
10	10	30	820	1,340	618	672	490	198	205	346	73	70
11	12	22	820	700	515	700	540	166	152	212	318	61
12	12	30	540	1,480	590	700	645	152	138	350	58	41
13	10	25	540	2,040	590	590	820	540	128	346	59	46
14	14	25	515	1,200	565	515	700	395	124	338	195	40
15	20	35	490	1,200	350	310	618	306	2,510	40	172	36
16	49	37	418	2,670	1,690	440	515	255	1,900	38	119	31
17	52	53	395	2,830	1,480	540	440	230	880	40	252	27
18	52	72	233	6,250	1,000	565	310	182	515	233	1,480	26
19	55	61	233	6,250	700	515	310	152	372	182	565	72
20	52	61	672	3,550	195	465	290	152	152	138	30	790
21	49	51	3,010	1,690	124	440	326	155	198	114	198	440
22	42	25	6,140	1,000	18	395	233	163	166	114	166	940
23	32	25	1,900	760	182	372	219	155	152	182	169	490
24	31	25	940	730	322	350	440	116	112	133	270	282
25	31	45	700	1,340	790	350	440	53	91	94	195	198
26	31	38	940	1,270	1,200	440	418	314	67	82	172	82
27	40	36	700	1,000	618	940	350	248	62	62	152	59
28	69	34	590	730	645	334	395	270	52	310	119	93
29	46	33	790	618	.....	318	1,900	274	44	45	82	93
30	61	30	2,590	790	.....	618	2,350	310	40	56	36	84
31	56	.....	3,100	940	.....	540	.....	270	.....	77	372	.....
1915–16.												
1	77	188	290	1,340	2,510	672	1,060	326	590	160	110	21
2	5,260	112	278	4,830	3,100	850	1,000	618	240	141	51	32
3	2,040	70	259	3,930	1,970	1,340	850	195	395	2,670	56	34
4	314	70	237	1,760	1,200	1,060	1,480	195	465	1,690	133	31
5	590	55	237	1,130	1,000	1,000	850	700	490	672	110	34
6	440	89	141	1,000	1,690	940	760	645	350	342	618	22
7	372	82	230	1,200	2,350	2,590	618	515	1,480	226	618	32
8	310	82	216	940	2,350	6,250	1,130	540	395	160	342	22
9	240	114	198	820	1,690	2,920	940	1,060	270	119	244	30
10	149	95	138	700	1,340	1,690	850	820	318	69	219	30
11	141	93	346	3,930	1,200	1,200	940	672	395	17	259	29
12	138	93	248	9,920	2,190	1,130	440	490	286	17	244	49
13	119	152	212	3,930	6,250	820	1,060	342	248	116	590	25
14	338	160	395	2,750	4,330	1,410	1,130	248	198	212	645	266
15	91	4,030	880	1,690	1,900	5,150	1,060	195	540	51	440	2,190
16	104	4,530	3,640	1,690	1,340	3,100	940	395	169	51	266	1,480
17	99	1,620	1,340	1,060	940	1,830	820	940	252	185	219	760
18	95	514	8,100	880	790	1,200	850	645	172	1,900	298	326
19	95	618	7,740	940	700	940	850	700	286	1,480	192	198
20	2,350	820	2,510	1,340	590	940	645	490	418	318	116	141
21	1,200	820	1,340	4,130	880	850	590	334	418	202	97	110
22	700	1,000	880	2,430	1,060	1,620	540	342	790	136	91	89
23	490	346	672	1,690	880	1,200	1,000	314	590	110	75	75
24	465	590	540	1,690	820	2,750	760	334	263	35	56	73
25	372	742	334	1,270	850	1,620	790	342	192	25	56	61
26	233	895	263	880	1,200	1,480	3,460	274	1,900	294	56	59
27	219	1,050	1,060	700	1,060	850	2,350	1,480	790	208	25	45
28	198	1,200	1,130	565	820	1,200	1,830	1,060	372	163	10	41
29	166	820	2,920	540	700	2,190	1,410	1,480	322	418	55	67
30	124	286	5,920	2,670	.....	1,480	490	1,480	286	172	29	2,040
31	350	.....	2,670	3,100	.....	1,340	.....	302	.....	133	28	.....

Monthly discharge of Tygart River at Belington, W. Va., for the years ending Sept. 30, 1914–1916.

[Drainage area, 390 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1913–14.					
October	3,640	82	796	2.04	2.35
November	10,600	155	1,940	4.97	5.54
December	2,830	166	869	2.23	2.57
January	4,430	372	1,550	3.97	4.58
February	8,700	490	1,680	4.31	4.49
March	4,430	440	1,390	3.56	4.10
April	5,260	590	2,290	5.87	6.55
May	3,640	15	465	1.19	1.37
June	1,340	8	127	.326	.36
July	2,510	17	407	1.04	1.20
August	318	20	100	.256	.30
September	418	7	63.7	.163	.18
The year	10,600	7	965	2.47	33.59
1914–15.					
October	69	3	29.2	0.075	0.09
November	72	22	39.4	.101	.11
December	6,140	30	968	2.48	2.86
January	6,250	270	1,760	4.51	5.20
February	7,620	18	1,440	3.69	3.84
March	940	310	539	1.38	1.59
April	2,350	219	552	1.42	1.58
May	1,340	53	317	.813	.94
June	2,510	40	478	1.23	1.37
July	350	22	127	.326	.38
August	1,480	30	215	.551	.64
September	940	26	168	.431	.48
The year	7,620	3	549	1.41	19.08
1915–16.					
October	5,260	77	577	1.48	1.71
November	4,530	55	705	1.81	2.02
December	8,100	138	1,460	3.74	4.31
January	9,920	540	2,110	5.41	6.24
February	6,250	590	1,640	4.21	4.54
March	6,250	672	1,730	4.44	5.12
April	3,460	440	1,050	2.69	3.00
May	1,480	195	596	1.53	1.76
June	1,900	169	463	1.19	1.33
July	2,670	17	403	1.03	1.19
August	645	10	205	.526	.61
September	2,190	21	280	.718	.80
The year	9,920	10	935	2.40	32.63

TYGART RIVER AT FETTERMAN, W. VA.

LOCATION.—At highway bridge at Fetterman, Taylor County, three-fourths mile above mouth of Otter Creek.

DRAINAGE AREA.—1,340 square miles.

RECORDS AVAILABLE.—June 3, 1907, to September 30, 1916.

GAGE.—Chain gage attached to downstream side of highway bridge; read by Joseph Gerken. Sea-level elevation of zero of gage, 957.86 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.2 feet at 7 a. m. January 12 (discharge, 35,600 second-feet); minimum stage, 3.31 feet September 8–9 (discharge, 93 second feet).

No records of floods previous to installation of gage; highest stage recorded since station was established, 29.1 feet in July, 1912.

ICE.—Ice probably does not affect stage-discharge relation. It is said that riffle below gage usually remains open.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during this year. Rating curve revised below 4.6 feet by means of low-water measurements made in 1914 and September, 1916; well defined between 100 and 23,000 second-feet, poorly defined below 100 second-feet. Gage read twice daily to half-tenths. Discharge ascertained by applying mean daily gage heights to rating table. Results good.

Discharge measurements of Tygart River at Fetterman, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 16	B. E. Jones	10.66	12,300	Sept. 12	L. Lee	3.88	384
18	Do	6.39	4,170	28	....do	3.52	162
23	Stewart and Jones	14.42	21,100				

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,290	348	832	6,000	11,100	2,440	3,340	2,440	1,530	638	273	124
2	14,800	315	810	20,700	11,500	3,340	2,790	2,020	1,230	503	216	160
3	7,160	285	790	13,200	5,620	4,480	2,360	1,770	1,030	770	168	130
4	3,720	255	810	6,190	3,720	4,290	3,150	1,770	975	2,360	144	168
5	2,440	233	730	3,720	3,340	3,340	3,340	1,930	1,160	2,020	127	130
6	2,270	228	665	3,910	2,970	3,150	2,790	1,770	920	876	594	99
7	1,930	255	638	4,670	8,140	8,720	2,270	3,150	843	612	920	108
8	1,380	255	620	3,720	8,340	18,800	1,930	4,290	975	503	887	93
9	1,030	285	638	2,610	6,000	9,900	2,270	3,910	975	374	780	93
10	810	255	638	2,790	5,240	5,240	2,440	2,970	1,100	309	620	141
11	692	255	535	11,700	4,290	3,720	2,790	2,360	1,160	279	487	503
12	603	267	535	33,100	4,100	2,970	3,150	1,930	1,160	279	832	367
13	519	367	620	19,000	26,600	2,610	3,150	920	920	279	2,180	255
14	455	495	865	9,900	16,400	3,530	2,790	1,230	710	250	2,180	255
15	418	7,360	1,030	5,810	7,160	14,800	2,610	1,300	594	410	1,100	1,930
16	380	13,600	1,530	3,720	4,480	11,100	2,440	1,300	1,610	367	780	6,780
17	348	6,000	9,900	2,970	3,340	6,380	2,270	1,530	2,180	479	638	2,790
18	315	3,340	24,800	1,850	2,790	4,480	2,610	2,440	1,380	1,530	487	810
19	440	2,610	21,200	1,610	2,440	3,340	2,440	1,850	1,300	1,930	432	832
20	1,930	2,970	9,120	1,610	1,930	2,970	2,180	1,300	1,610	1,160	380	578
21	2,020	3,150	4,480	5,240	1,770	2,610	1,850	1,100	2,360	720	328	455
22	1,300	2,790	2,970	7,160	2,610	10,500	1,690	920	3,150	519	328	367
23	1,030	2,360	2,270	7,560	2,440	19,500	1,690	821	2,360	544	360	285
24	760	1,930	1,850	6,000	2,270	9,310	1,610	790	1,610	647	250	255
25	603	1,610	1,530	4,670	7,560	5,240	1,850	770	1,850	479	206	211
26	535	1,300	1,850	2,970	6,580	3,530	5,240	720	4,680	402	182	164
27	471	1,030	2,790	2,270	3,150	3,530	5,810	1,100	2,790	463	152	191
28	440	920	4,100	1,850	2,970	4,290	4,480	2,360	1,770	402	124	155
29	440	1,030	13,600	2,100	2,610	5,430	3,720	1,690	1,100	367	141	730
30	380	920	18,300	10,500	.....	5,240	2,970	1,300	800	479	152	2,790
31	380	.....	9,500	11,100	.....	4,480	.....	1,530	.....	348	124	.....

Monthly discharge of Tygart River at Fetterman, W. Va., for the year ending Sept. 30, 1916.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	14,800	315	1,750	1.31	1.51
November	13,600	228	1,900	1.42	1.58
December	24,800	535	4,530	3.38	3.90
January	33,100	1,610	7,100	5.30	6.11
February	26,600	1,770	5,910	4.41	4.76
March	19,500	2,440	6,230	4.65	5.36
April	5,810	1,610	2,800	2.09	2.33
May	4,290	720	1,780	1.33	1.53
June	4,860	594	1,530	1.14	1.27
July	2,360	250	687	.513	.59
August	2,180	124	535	.399	.46
September	6,780	93	732	.546	.61
The year	33,100	93	2,960	2.21	30.01

MONONGAHELA RIVER AT LOCK 15, HOULT, W. VA.

LOCATION.—At Lock 15, at Hoult, 2½ miles below county highway bridge at Fairmont, Marion County, and 4 miles below mouth of West Fork. Buffalo Creek enters on left three-fourths mile above station.

DRAINAGE AREA.—2,340 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 7, 1915, to September 30, 1916. Upper and lower gages at Lock 15 have been read under direction of United States Engineer Corps since May 1, 1904.

GAGE.—Upper gage at lock; lower section is set in recess in left lock wall just above upper gate; upper section is 61.5 feet from face of right lock wall, directly opposite lower section. Read by Charles R. Hall, lock master.

DISCHARGE MEASUREMENTS.—Made from bridge at Fairmont or by wading on crest of dam. Flow of Buffalo Creek is added to discharge measured at bridge.

CHANNEL AND CONTROL.—One channel at all stages; straight half a mile above and below bridge. Control for station is crest of dam; permanent. Point of zero flow, gage height 6.9 feet, elevation of crest of dam. Leakage through lock and occasional opening of valves of lock may affect stage at which flow would be zero.

EXTREMES OF DISCHARGE.—Maximum stage recorded during 1915–16, 17.8 feet at 12 m. January 12, 1916 (discharge, 60,100 second-feet); minimum stage, 6.10 feet at 6 p. m. July 31, 1916, due to opening the valves. Flood of 1888 reached a stage represented by gage height about 26 feet.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Leakage through lock and water used for lockages. See "Accuracy."

REGULATION.—None under normal conditions. Pool No. 15 may be lowered at times in the interest of navigation.

ACCURACY.—Stage-discharge relation permanent except for effect of operations at lock and change in leakage through lock, the change depending on which gates are open; not affected by ice. Rating curve well defined to 62,000 second-feet. Gage read twice daily to hundredths, beginning April 7, 1915; prior to that date at 8 a. m. daily to tenths. Daily discharge ascertained by applying mean daily gage heights to rating table. Rating table makes allowance, based on measurement, for leakage of 50 second-feet through upper gates; under normal conditions upper gates are closed; gage reader records number of lockages and length of time upper gates are open. Determination of daily discharge April 7, 1915, to September 30, 1916, corrected for effect of lockage and change in leakage when upper gates at lock are open. Data for correcting earlier record not available. Discharge October 1–20, 1914, when valves of lock were open and pool was lowered below crest of dam determined from study of conditions before and after opening of valves and the flow at Fetterman, Enterprise, and Barrackville. May 25 and July 30 to August 3, 1916, discharge interpolated because valves were open for considerable periods with little or no flow over the dam. Results considered good.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

The following discharge measurement of leakage through the lower gates, Lock 15, was made by Lasley Lee:

September 26, 1916: Gage height, 7.38 feet; discharge, 152 second-feet. The lower gates were shut and upper gates open.

Daily discharge, in second-feet, of Monongahela River at Lock 15, Hoult, W. Va., for the years ending Sept. 30, 1915 and 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	.....	160	230	8,260	17,200	2,230	1,780	5,520	7,000	216	257	2,000
2	.....	230	1,000	4,830	35,200	2,000	1,570	3,570	4,180	227	378	1,370
3	.....	230	1,000	3,000	32,200	1,780	1,370	2,470	5,170	257	617	905
4	.....	230	1,180	2,230	27,300	1,570	1,180	2,120	6,260	254	2,610	676
5	.....	230	5,520	1,780	13,000	1,570	1,180	1,680	5,520	270	1,380	549
6	.....	230	13,000	1,570	9,630	1,570	1,000	1,470	3,430	257	677	502
7	.....	230	5,520	26,600	8,260	5,170	881	1,180	2,350	248	467	752
8	.....	230	4,500	24,000	6,620	5,170	864	1,090	1,780	288	383	717
9	.....	230	6,620	10,600	4,830	4,500	628	989	1,370	302	549	1,040
10	.....	230	6,250	5,880	3,570	3,570	834	868	1,120	306	627	1,010
11	.....	160	5,520	3,870	3,000	3,000	1,140	708	836	261	464	755
12	.....	160	4,830	12,000	2,730	3,000	1,180	672	855	244	380	581
13	.....	160	3,280	27,300	3,000	2,470	1,780	646	770	268	468	485
14	.....	160	2,730	12,500	3,870	2,230	2,010	738	693	291	476	364
15	.....	160	1,780	9,630	4,180	2,000	1,890	966	3,440	264	367	316
16	.....	160	1,180	12,500	6,620	1,780	1,700	814	3,870	304	448	286
17	.....	160	1,180	10,600	7,400	1,570	1,380	738	2,350	388	444	333
18	.....	160	1,180	13,500	5,170	1,570	1,180	646	1,490	492	1,480	530
19	.....	230	1,180	24,600	3,570	1,570	1,140	558	906	382	2,010	8,260
20	.....	320	7,400	17,800	2,730	1,570	966	523	798	566	1,380	3,420
21	110	230	21,400	9,630	2,230	1,570	830	510	615	603	921	3,590
22	160	230	39,200	5,880	1,780	1,570	802	1,890	500	500	670	5,170
23	160	320	15,600	4,180	1,570	1,570	915	5,880	412	363	618	3,870
24	160	320	6,250	8,260	1,570	1,780	2,350	3,000	390	426	702	2,120
25	160	230	3,870	7,400	1,570	1,780	2,860	2,260	342	372	987	1,380
26	160	230	2,230	13,000	2,000	1,780	2,230	1,570	319	305	1,170	953
27	160	230	1,570	8,260	2,730	2,470	1,800	1,390	240	274	918	802
28	160	230	1,370	5,880	2,470	3,000	5,520	1,180	216	233	865	686
29	160	160	1,370	4,180	.....	2,730	9,630	1,500	210	232	1,580	560
30	160	230	8,710	3,000	.....	2,230	7,400	7,030	216	216	1,890	508
31	160	.....	17,200	2,730	.....	2,000	.....	8,720	.....	213	2,600	.....
1915–16.												
1	9,200	475	1,300	9,170	22,000	4,029	5,170	3,720	2,600	963	296	217
2	27,400	420	1,140	36,800	20,800	4,660	4,180	3,000	1,890	740	260	226
3	12,500	403	1,140	21,400	12,000	8,710	3,430	2,470	1,680	645	224	258
4	5,880	370	1,280	10,100	7,820	7,820	4,020	2,730	1,370	2,380	188	280
5	3,720	340	1,280	5,880	6,250	5,880	5,170	2,860	1,470	2,130	181	242
6	3,570	346	1,150	6,620	5,520	5,170	4,020	3,000	1,200	1,280	576	218
7	3,020	330	1,040	8,260	15,000	13,500	3,280	7,000	2,000	723	1,370	202
8	2,230	344	968	6,620	14,000	26,600	3,000	10,100	2,470	616	1,280	218
9	1,570	362	1,000	4,340	9,170	15,000	4,180	7,030	1,780	490	1,280	262
10	1,290	338	1,000	4,180	10,100	7,820	5,000	4,860	1,780	400	1,010	254
11	990	320	864	15,000	7,820	5,880	4,500	3,600	3,000	364	834	343
12	832	340	782	55,000	7,000	4,660	4,340	2,740	2,120	337	4,500	600
13	706	382	847	36,800	47,400	4,020	4,180	2,120	1,570	325	4,500	439
14	609	544	1,470	17,800	30,100	4,500	3,870	1,790	1,190	320	4,830	356
15	519	6,250	1,890	9,630	11,500	22,600	3,420	1,810	1,790	323	2,150	1,180
16	483	20,800	1,780	6,250	7,000	17,200	3,140	1,910	8,710	422	1,370	7,820
17	431	9,640	16,600	4,830	5,520	10,600	2,730	1,780	5,170	442	970	4,660
18	410	4,660	48,200	2,730	5,170	7,400	3,000	2,730	2,880	973	690	2,120
19	3,000	3,570	35,200	1,780	4,500	5,880	3,140	2,230	2,140	3,590	537	1,300
20	2,880	5,880	15,600	2,350	4,020	4,500	2,600	1,680	3,280	2,240	564	864
21	3,180	5,520	7,400	7,000	4,020	4,020	2,230	1,290	5,180	1,280	453	586
22	2,010	4,500	4,830	12,500	3,870	21,400	2,230	1,110	7,820	793	405	508
23	1,470	3,580	3,720	12,500	3,720	31,500	2,230	1,020	4,660	716	465	415
24	1,140	2,860	2,860	9,630	3,420	14,500	2,120	979	2,730	1,130	361	380
25	898	2,230	2,350	6,250	26,600	7,820	2,120	1,130	2,730	670	306	332
26	798	1,780	2,730	4,500	17,200	5,520	4,830	1,280	5,170	519	269	311
27	750	1,570	3,570	3,870	8,710	4,660	7,400	1,380	4,030	486	255	293
28	628	1,480	5,880	3,280	5,520	5,520	6,250	3,010	2,350	448	266	253
29	586	1,370	24,000	3,420	4,500	10,100	5,200	5,000	1,720	404	284	302
30	538	1,370	32,200	20,200	.....	9,170	5,000	2,730	1,210	368	284	2,230
31	508	.....	15,600	18,400	.....	7,000	.....	2,730	.....	332	249	.....

Monthly discharge of Monongahela River at Lock 15, Hoult, W. Va., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 2,430 square miles.]

Month.	Discharge in second-feet.				Run-off depth in inches on drainage area.
	Maximum.	Minimum.	Mean.	Per square mile.	
1914–15.					
October	160	.....	120	0.049	0.06
November	320	160	216	.089	.10
December	39,200	230	6,250	2.57	2.96
January	27,300	1,570	9,850	4.05	4.67
February	35,200	1,570	7,710	3.17	3.39
March	5,170	1,570	2,330	.959	1.11
April	9,630	628	2,000	.823	.92
May	8,720	510	2,030	.835	.96
June	7,000	210	1,920	.790	.88
July	603	213	317	.130	.15
August	2,610	257	928	.382	.44
September	8,260	286	1,480	.609	.68
The year	39,200	.....	2,910	1.20	16.23
1915–16.					
October	27,400	410	3,020	1.24	1.43
November	20,800	320	2,750	1.13	1.26
December	48,200	782	7,730	3.18	3.67
January	55,000	1,780	11,800	4.86	5.60
February	47,400	3,420	11,400	4.69	5.06
March	31,500	4,020	9,920	4.08	4.70
April	7,400	2,120	3,870	1.59	1.77
May	10,100	979	2,930	1.21	1.40
June	8,710	1,190	2,920	1.20	1.34
July	3,590	320	866	.356	.41
August	4,830	181	1,010	.416	.48
September	7,820	202	922	.379	.42
The year	55,000	181	4,920	2.02	27.54

MIDDLE FORK RIVER AT MIDVALE, W. VA.

LOCATION.—About one-third mile above Midvale station on the Coal & Coke Railroad, two-thirds mile below post office at Ellamore, Randolph County. Laurel Creek enters river on right about 1¾ miles above station.

DRAINAGE AREA.—122 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 3, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff on right bank; read by Anna Riley.

DISCHARGE MEASUREMENTS.—Made from cable or by wading short distance below gage.

CHANNEL AND CONTROL.—One channel at all stages; straight 300 feet above and 100 feet below cable section. Both banks are high and in most places wooded. Control probably permanent. Point of zero flow, gage height, 0.55±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during 1915–16, 9.3 feet at 7 p. m. December 18, 1915 (discharge, about 3,680 second-feet); minimum stage, 1.20 feet at 7 p. m. September 1, 1916 (discharge, 5 second-feet). Floods of 1888 and 1912 reached gage height of approximately 18 feet.

ICE.—Stage-discharge relation affected by ice for short periods in severe winters.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice this year. Rating curve well defined below, but extension above 1,600 second-feet. Gage read twice daily to hundredths. Discharge ascertained by applying mean daily gage heights to rating table. Results excellent.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

Discharge measurements of Middle Fork River at Midvale, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 23	J. E. Stewart	5.38	1,200
24	....do	4.58	838
Sept. 17	Lasley Lee	2.54	165

Daily discharge, in second-feet, of Middle Fork River at Midvale, W. Va., for the year ending Sept. 30, 1915, and 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1915.						1915.					
1	.....	350	17	48	89	16	89	244	15	24	25
2	.....	294	28	34	60	17	82	158	35	82	18
3	209	350	21	38	52	18	75	112	52	178	17
4	178	380	27	33	56	19	68	82	40	104	60
5	158	294	25	25	55	20	68	62	29	62	120
6	138	188	.....	18	46	21	82	52	38	55	232
7	112	148	25	16	39	22	104	57	38	57	220
8	112	129	18	14	55	23	129	46	31	89	120
9	89	89	31	26	48	24	120	36	25	82	82
10	82	75	33	42	42	25	120	31	21	75	62
11	68	62	26	27	33	26	112	25	20	68	49
12	75	68	40	23	28	27	138	23	14	52	52
13	120	48	33	30	27	28	112	43	10	62	48
14	104	1,340	25	28	27	29	138	35	15	96	38
15	96	442	16	27	36	30	158	35	26	112	35
						31	618	.....	82	104	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	970	46	104	740	1,240	209	336	232	178	79	11	7
2	1,180	47	112	2,250	922	322	410	209	148	62	9	9
3	474	44	92	1,020	580	442	442	188	209	112	7	18
4	294	39	95	580	508	350	580	256	178	95	7	13
5	220	38	79	410	336	308	442	244	138	65	54	13
6	198	38	89	474	294	322	380	232	138	48	129	9
7	158	38	83	442	922	2,250	294	380	138	41	120	9
8	120	38	83	350	618	1,940	244	410	148	36	62	9
9	92	46	86	474	544	740	232	322	120	33	42	102
10	81	39	81	336	508	508	198	268	120	35	37	60
11	70	35	100	2,900	410	380	281	232	112	32	31	34
12	52	42	104	2,700	410	281	322	178	83	25	72	24
13	52	95	104	1,340	3,280	294	281	158	67	129	57	18
14	42	104	129	658	1,070	1,070	322	138	62	100	46	178
15	42	2,380	148	508	658	2,000	281	138	79	52	42	1,460
16	40	1,070	244	442	410	874	256	148	65	48	33	365
17	37	508	2,130	308	336	442	350	322	75	75	32	138
18	35	350	3,610	474	281	410	350	294	58	112	33	83
19	104	294	1,570	508	232	360	281	220	129	67	22	57
20	158	308	698	508	158	281	220	178	178	46	18	46
21	138	294	442	1,020	294	281	220	138	148	38	17	39
22	120	294	308	740	268	1,940	209	129	168	35	15	35
23	101	244	268	874	268	1,400	168	129	120	30	10	33
24	86	198	209	580	244	618	256	112	100	25	11	28
25	79	168	188	410	410	544	442	95	1,070	18	23	25
26	72	138	350	322	410	365	618	410	508	24	17	22
27	75	138	308	268	308	336	508	410	281	25	10	20
28	72	129	474	209	281	410	410	268	178	17	14	17
29	62	120	1,880	220	244	474	350	198	112	25	18	168
30	57	120	1,880	922	.....	474	281	268	92	15	12	232
31	48	.....	874	922	.....	410	.....	220	.....	14	9	.....

Monthly discharge of Middle Fork River at Midvale, W. Va., for the years ending Sept. 30, 1915, and 1916.

[Drainage area, 122 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
May 3–31	618	68	129	1.06	1.14
June	1,340	23	177	1.45	1.62
July	82	10	28.6	.234	.27
August	178	14	55.9	.458	.52
September	232	14	62.4	.511	.57
1915–16.					
October	1,180	35	172	1.41	1.63
November	2,380	35	248	2.03	2.26
December	3,610	79	546	4.48	5.16
January	2,900	209	771	6.32	7.29
February	3,280	158	567	4.65	5.02
March	2,250	209	678	5.56	6.41
April	618	168	332	2.72	3.04
May	410	95	230	1.89	2.18
June	1,070	58	173	1.42	1.58
July	129	14	50.3	.412	.48
August	129	7	32.9	.242	.28
September	1,460	7	109	.894	1.00
The year	3,610	7	326	2.67	36.33

BUCKHANNON RIVER AT HALL, W. VA.

LOCATION.—About 500 feet below ruins of an old milldam, one-fourth mile above the post office and county highway bridge at Hall, Barbour County, 1 mile from Baltimore & Ohio Railroad station. Pecks Run enters river on left 1 mile below station.

DRAINAGE AREA.—277 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 15, 1915, to September 30, 1916. June 7, 1907, to May 25, 1909, chain gage at county highway bridge.

GAGE.—Vertical and inclined staff on right bank; read by James Newcomb.

DISCHARGE MEASUREMENTS.—Made from county highway bridge. Stay wire used for measurements at high stages.

CHANNEL AND CONTROL.—Gage is about midway between beginning and end of rapids having approximately 10 feet fall. Bed of stream in rapids composed of large boulders, rocks, and gravel; should be fairly permanent. Both banks are high and wooded and are not overflowed except into an old mill race on left bank.

EXTREMES OF DISCHARGE.—Maximum stage recorded during 1915–16, 11.0 feet at 6 a. m. January 12, 1916 (discharge, 8,860 second-feet); minimum stage, 1.85 feet at 6 a. m. September 8, 1915 (discharge, 28 second-feet).

Highest flood known reported to have reached a gage height of about 14 feet in 1888.

ICE.—Stage-discharge relation affected by ice during severe winters.

DIVERSIONS.—No water diverted above station except small quantity which may flow around gage in abandoned mill race above ordinary low stages and which is included in flow measured at county highway bridge.

ACCURACY.—Stage-discharge relation practically permanent; not materially affected by ice this year. Rating curve well defined between 60 and 4,500 second-feet; beyond these limits curve is an extension. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. Results excellent.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

Discharge measurements of Buckhannon River at Hall, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 16	B. E. Jones	4.38	1,940
23	do	6.20	3,710
Sept. 18	Lasley Lee	2.90	403

Daily discharge in second-feet, of Buckhannon River at Hall, W. Va., for the years ending Sept. 30, 1915, and 1916.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1915.							1915						
1	.....	970	870	34	324	338	16	374	117	265	44	60	78
2	.....	580	628	35	158	228	17	352	104	239	50	76	62
3	.....	442	770	39	426	170	18	277	98	180	204	239	58
4	.....	352	1,840	56	304	154	19	223	83	134	304	324	117
5	.....	297	1,120	58	146	194	20	199	83	194	166	234	628
6	.....	244	675	62	90	213	21	180	96	88	117	138	870
7	.....	213	458	65	65	170	22	199	117	80	158	124	1,120
8	.....	199	352	64	60	218	23	367	162	88	138	138	580
9	.....	180	284	53	69	239	24	628	228	78	104	249	374
10	.....	146	213	54	189	175	25	474	239	62	83	199	260
11	.....	124	162	67	130	150	26	381	199	50	65	244	194
12	.....	114	142	56	93	117	27	331	194	44	56	204	162
13	.....	138	146	60	60	88	28	3,310	223	39	46	260	146
14	.....	166	130	67	71	86	29	1,840	213	37	48	490	146
15	426	146	154	51	76	88	30	1,610	426	36	62	628	108
							31	.....	1,390	.....	213	580	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	1,840	84	265	1,500	2,820	675	770	627	381	194	41	36
2	3,690	80	239	4,570	2,620	870	627	490	297	154	40	51
3	1,720	73	265	2,920	1,500	1,720	580	482	270	228	39	41
4	1,020	69	265	1,280	1,020	1,220	970	535	410	580	36	36
5	722	65	260	870	870	870	820	627	311	338	38	35
6	675	65	234	1,070	770	970	675	535	260	249	54	36
7	580	62	223	1,280	2,400	2,920	580	722	270	170	62	30
8	426	56	204	870	1,720	4,470	490	1,070	304	124	44	30
9	311	58	213	675	1,390	1,840	535	920	331	98	40	38
10	249	58	213	820	1,390	1,170	490	675	297	93	51	535
11	208	58	180	3,600	1,070	920	482	535	426	93	54	244
12	170	62	154	8,200	770	820	580	426	338	93	249	146
13	146	76	239	4,370	6,220	722	627	352	249	93	535	93
14	127	204	450	2,290	4,170	1,170	580	297	189	78	324	73
15	111	2,400	374	1,280	1,500	3,600	580	265	166	69	260	1,610
16	98	3,780	418	970	1,020	2,290	490	249	199	76	162	2,180
17	90	1,280	2,070	770	770	1,390	535	324	260	117	127	820
18	80	870	5,680	396	675	1,070	675	338	228	324	114	474
19	76	580	5,170	324	580	820	580	304	180	770	88	304
20	228	675	1,840	474	490	675	535	228	410	338	71	204
21	254	675	1,070	1,960	474	627	458	189	458	208	58	138
22	194	580	722	1,610	458	3,020	442	175	490	124	64	104
23	170	535	580	1,840	442	4,170	403	162	410	101	54	98
24	146	442	474	1,440	458	1,720	338	162	297	86	51	88
25	134	360	403	970	2,510	1,070	410	166	770	76	43	76
26	127	304	580	722	1,720	770	870	304	1,170	65	39	67
27	117	277	675	580	1,070	627	920	920	627	62	38	56
28	114	304	1,120	474	770	675	870	535	396	53	39	51
29	108	290	3,400	466	675	920	920	374	284	48	39	284
30	98	290	4,270	1,960	.....	1,070	770	331	239	43	40	1,340
31	90	.....	1,960	1,500	.....	870	.....	396	.....	40	38	.....

Monthly discharge of Buckhannon River at Hall, W. Va., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 277 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
April 15-30	3,310	180	698	2.52	1.50
May	1,390	83	267	.964	1.11
June	1,840	36	316	1.14	1.27
July	304	34	86.4	.312	.36
August	628	60	208	.751	.87
September	1,120	58	251	.906	1.01
1915-16.					
October	3,690	76	455	1.64	1.89
November	3,780	56	490	1.77	1.98
December	5,680	154	1,100	3.97	4.58
January	8,200	324	1,680	6.06	6.99
February	6,220	442	1,460	5.27	5.68
March	4,470	627	1,480	5.34	6.16
April	970	338	620	2.24	2.50
May	1,070	162	442	1.60	1.84
June	1,170	166	364	1.31	1.46
July	770	40	167	.603	.70
August	535	36	94.6	.342	.39
September	2,180	30	311	1.12	1.25
The year	8,200	30	721	2.60	35.42

WEST FORK RIVER AT BUTCHERVILLE, W. VA.

LOCATION.—At Weston & Clarksburg Electric Railway Co.'s trolley bridge, one-fourth mile upstream from Butcherville, Lewis County, about 3 miles north of Weston. Freemans Creek enters river on left about a mile below station.

DRAINAGE AREA.—181 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 8, 1915, to September 30, 1916.

GAGE.—Chain gage fastened to upstream side of trolley bridge near center of span; read by Bess Ervin.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Stay wire used for measurements at high stages.

CHANNEL AND CONTROL.—One channel except at extreme high stages, when river overflows right bank and a little water passes through two small culverts in trolley embankment; straight for 500 feet above and curved for 1,000 feet below station. Stream bed is sand and gravel, but is solid rock at riffle below gage. Control probably permanent. Growth of aquatic plants may cause backwater at gage during summer months.

EXTREMES OF STAGE.—Maximum stage recorded during year, 22.35 feet at 9.30 a. m. January 12; minimum stage, 3.59 feet at 9.30 a. m. August 4.

Highest flood known is reported to have reached a stage represented by gage height of about 27 feet in 1888. Dam since washed out may have increased height of this flood.

ICE.—Stage-discharge relation affected by ice in severe winters.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice in 1915-16. Measurements of flow do not indicate noteworthy backwater from growth of aquatic plants. Gage read twice daily to hundredths. Data inadequate for determining daily discharge.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

Discharge measurements of West Fork River at Butcherville, W. Va., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.
1915		*Feet.*	*Sec.-ft.*
Apr. 8	Stewart and Inglefield	4.42	37.0
May 19	J. E. Stewart	4.17	19.0
Sept. 13	B. J. Peterson	4.64	48.4
1916			
Sept. 19	L. Lee	4.71	54.0

Daily gage height, in feet, of West Fork River at Butcherville, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16.15	4.16	5.04	7.52	12.95	6.24	5.97	5.83	4.76	4.46	3.70	3.99
2	11.91	4.09	5.09	11.83	8.05	8.15	5.65	5.53	4.50	4.35	3.66	3.99
3	7.11	4.09	5.48	7.58	7.10	8.56	6.25	5.44	4.31	4.23	3.63	3.99
4	6.04	4.06	5.44	6.24	6.59	7.02	7.63	5.95	4.61	4.16	3.60	3.91
5	6.84	4.04	5.24	5.80	6.57	6.55	6.61	6.16	4.63	4.12	3.96	3.99
6	6.42	4.02	5.08	7.76	6.77	7.74	6.04	7.48	4.46	4.02	6.96	3.83
7	5.82	4.04	4.98	7.42	10.37	12.32	5.65	8.92	4.49	3.94	5.70	3.77
8	5.42	3.97	4.96	6.27	7.23	8.56	5.75	7.86	4.72	3.93	5.00	3.77
9	5.12	4.04	4.97	6.05	8.37	6.70	6.62	5.92	4.63	3.88	5.23	4.61
10	4.92	4.04	4.89	6.67	7.93	6.37	6.41	5.72	4.71	3.81	5.19	5.65
11	4.80	4.02	4.70	13.21	6.77	6.36	6.13	5.43	5.43	3.74	5.04	4.75
12	4.68	4.05	4.76	21.07	9.15	6.04	5.92	5.16	5.03	3.68	8.42	4.49
13	4.60	4.47	5.82	11.27	18.70	5.96	5.60	5.00	4.73	3.66	6.30	4.29
14	4.49	4.84	6.44	7.95	8.74	6.36	5.48	4.86	4.50	3.70	5.68	4.15
15	4.48	12.02	5.68	6.37	6.66	10.12	5.39	4.72	5.69	3.66	5.11	7.65
16	4.51	9.04	5.52	6.09	6.20	7.96	5.19	4.67	7.04	3.82	5.01	7.50
17	4.40	6.24	13.13	5.75	6.02	7.28	5.35	4.70	5.69	4.41	4.72	5.68
18	4.37	5.54	16.50	5.47	5.92	6.54	5.93	4.64	5.11	4.55	4.47	5.39
19	4.82	5.78	9.86	5.25	5.72	6.12	5.43	4.52	6.39	5.30	4.31	4.68
20	5.13	6.46	6.89	6.13	5.58	5.71	5.21	4.58	6.61	5.12	4.16	4.46
21	5.07	6.26	6.11	9.29	5.49	6.97	5.09	4.47	5.68	4.91	4.08	4.30
22	4.85	5.66	5.66	7.60	5.29	14.52	5.35	4.34	6.67	4.57	4.01	4.26
23	4.68	5.34	5.44	8.25	5.24	9.37	5.16	4.33	5.48	4.29	3.97	4.22
24	4.53	5.14	5.26	6.81	5.53	6.81	5.01	4.24	4.51	4.18	3.91	4.18
25	4.44	4.95	5.12	6.10	15.56	6.11	5.73	4.24	6.61	4.08	3.87	4.14
26	4.36	4.82	5.90	5.77	8.54	5.74	6.05	5.84	6.00	4.02	3.91	4.12
27	4.38	4.90	6.00	5.55	6.89	5.85	6.21	5.07	5.29	3.98	3.85	4.08
28	4.36	4.92	8.74	5.43	6.16	8.93	6.01	4.84	4.86	3.84	3.85	4.04
29	4.32	5.00	14.30	5.53	6.22	8.39	7.54	4.80	4.69	3.73	3.83	4.74
30	4.25	5.10	10.24	11.17	.....	7.13	6.32	4.67	4.57	3.62	3.85	6.54
31	4.20	.....	6.96	7.53	.....	6.45	.....	5.07	.....	3.70	4.05	.....

WEST FORK RIVER AT ENTERPRISE, W. VA.

LOCATION.—At highway bridge at Enterprise, Harrison County, three-fourths mile above mouth of Bingamon Creek.

DRAINAGE AREA.—750 square miles.

RECORDS AVAILABLE.—June 2, 1907, to September 30, 1916.

GAGE.—Chain gage attached to bridge; read by C. M. Tetrick. Sea-level elevation of zero of gage, 869.91 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Channel at measuring section broken by one pier; smooth rock bottom. Straight above and below. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.1 feet at 4 p. m. December 18 (discharge, 17,000 second-feet); minimum stage, 0.8 foot July 14 and August 4 (discharge, 20 second-feet).

1907–1916: Maximum stage recorded, 18.8 feet at 8 a. m. November 16, 1913 (discharge, about 19,400 second-feet). Flood of 1888 reached stage represented by about 33 feet referred to datum of present gage.

ICE.—Stage-discharge relation may be affected for two or three weeks at a time during December, January, and February.

ACCURACY.—Stage-discharge relation practically permanent, not affected by ice this year. Rating curve well defined between 12 and 7,670 second-feet; beyond these limits curve is an extension. Gage read once daily to half-tenths, but occasionally to hundredths. Discharge ascertained by applying daily gage heights to rating table. Results good.

The following discharge measurement was made by L. Lee: September 20, 1916: Gage height, 1.72 feet: discharge, 147 second-feet.

Daily discharge, in second-feet, of West Fork River at Enterprise, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	10,900	104	286	3,250	5,740	1,230	1,680	1,030	798	208	33	36
2	11,700	79	266	2,950	5,970	2,010	861	829	418	155	33	36
3	7,430	72	307	2,010	4,520	1,680	861	621	372	146	25	36
4	5,740	72	372	1,840	3,990	1,840	1,530	649	307	99	20	48
5	798	72	350	1,450	2,360	1,840	1,530	737	266	99	40	48
6	1,530	79	328	2,010	1,840	1,840	1,090	798	172	89	25	58
7	959	79	266	3,050	8,160	6,940	829	5,740	2,090	58	43	48
8	593	89	286	1,840	4,200	6,200	798	4,420	1,600	48	227	48
9	441	74	286	1,530	2,750	2,950	767	2,180	566	40	418	99
10	307	72	286	1,380	1,680	1,600	1,840	1,530	418	37	514	79
11	208	79	266	7,670	2,750	1,530	1,380	893	286	33	1,090	286
12	190	89	227	15,400	16,600	1,160	1,090	540	286	25	2,950	155
13	124	89	208	13,000	10,400	1,090	926	540	992	22	3,050	99
14	155	124	418	4,630	6,080	1,600	767	707	7,300	20	2,010	72
15	155	1,680	1,030	2,090	4,630	7,180	678	621	3,560	28	593	441
16	112	5,860	861	1,230	2,750	4,630	649	514	2,180	33	441	1,680
17	119	2,010	8,780	1,090	2,180	2,750	441	418	1,530	25	36	959
18	99	893	15,400	2,460	1,530	2,180	593	266	1,090	28	43	395
19	2,750	1,450	14,600	2,180	1,380	1,380	489	208	678	79	124	246
20	1,090	2,360	6,200	2,180	829	1,230	465	190	540	1,680	172	140
21	707	2,180	4,630	5,070	1,030	1,230	395	208	266	678	140	190
22	540	1,380	2,950	5,740	926	8,900	441	227	4,850	350	72	208
23	350	959	1,680	3,560	767	9,400	441	266	1,680	208	52	227
24	246	566	1,450	2,360	678	2,950	418	372	1,380	124	48	190
25	208	489	1,380	2,180	14,000	1,680	465	489	1,380	89	43	172
26	208	395	3,460	1,840	6,820	1,230	540	514	1,090	64	36	112
27	208	350	13,000	992	4,250	1,090	621	566	861	45	33	64
28	155	350	9,400	1,090	1,680	1,380	1,230	514	678	43	43	52
29	155	328	7,180	1,230	1,380	4,420	1,380	1,840	540	89	64	72
30	124	286	5,290	9,400	.....	2,750	1,130	1,450	372	307	58	489
31	104	.....	4,420	5,629	.....	1,840	.....	1,160	.....	124	40	.....

NOTE.—No gage height recorded Feb. 27. Discharge interpolated.

Monthly discharge of West Fork River at Enterprise, W. Va., for the year ending Sept. 30, 1916.

[Drainage area, 750 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	11,700	99	1,560	2.08	2.40
November	5,860	72	757	1.01	1.13
December	15,400	208	3,410	4.55	5.25
January	15,400	992	3,620	4.83	5.57
February	16,600	678	4,200	5.60	6.04
March	9,400	1,090	2,890	3.85	4.44
April	1,840	395	878	1.17	1.30
May	5,740	190	1,000	1.33	1.53
June	7,300	172	1,280	1.71	1.91
July	1,680	20	164	.219	.25
August	3,050	20	404	.539	.62
September	1,680	36	226	.301	.34
The year	16,600	20	1,700	2.27	30.78

ELK CREEK NEAR CLARKSBURG, W. VA.

LOCATION.—At a footbridge near Clarksburg, Harrison County, 300 feet above Turkey Run and about 6 miles above mouth of creek.

DRAINAGE AREA.—107 square miles (determined by Pittsburgh Flood Commission).

RECORDS AVAILABLE.—October 11, 1910, to September 30, 1916.

GAGE.—Wooden staff fastened to a tree near right abutment of footbridge; read by E. H. Smith. On November 1, 1913, a metal gage section (0—3 feet) was attached to the gage, which was then lowered 1 foot to avoid negative readings. All gage heights published in Water Supply Papers refer to the new datum. Sea-level elevation of zero of gage, 955.01 feet.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading at section about 200 feet below bridge.

CHANNEL AND CONTROL.—Rocky and practically permanent; banks high and not subject to overflow. Point of zero flow, determined August 30, 1912, and September 11, 1916, about gage height 0.9 foot and 0.8 foot, respectively.

EXTREMES OF STAGE.—Maximum stage recorded during year, 8.65 feet at 8.30 a. m., February 13; minimum stage, 1.2 feet at 7 a. m., August 4. The flood of July, 1912, reached stage represented by 15 feet on the present gage.

ICE.—Stage-discharge relation may be affected by ice for short periods in December, January, and February.

ACCURACY.—Stage-discharge relation practically permanent, probably affected by ice during part of January, 1916. Gage read daily in the morning to half-tenths.

Data inadequate for estimates of discharge.

The following discharge measurements were made by wading, by Lasley Lee:

September 11, 1916: Gage height, 1.50 feet; discharge, 5.9 second-feet. Gage height, 1.50 feet; discharge, 5.3 second-feet.

Daily gage height, in feet, of Elk Creek near Clarksburg, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.45	1.5	1.85	2.95	5.75	2.45	2.4	2.15	2.0	1.6	1.3	1.45
2	4.1	1.45	1.85	4.5	3.55	2.95	2.25	2.05	1.85	1.6	1.3	1.45
3	2.85	1.45	1.85	3.45	3.05	3.35	2.15	2.05	1.8	1.6	1.25	1.45
4	2.4	1.4	1.8	2.8	2.8	2.95	2.6	2.1	1.7	1.9	1.2	1.4
5	2.25	1.4	1.75	2.45	2.75	2.7	2.35	2.05	1.65	1.65	1.25	1.35
6	2.45	1.4	1.8	2.95	2.75	2.55	2.25	2.05	1.6	1.55	1.35	1.35
7	2.3	1.45	1.75	2.8	4.35	4.35	2.15	3.35	1.65	1.5	2.0	1.3
8	2.05	1.55	1.75	2.65	2.95	3.55	2.15	3.25	1.95	1.5	1.6	1.3
9	2.0	1.5	1.65	2.8	3.0	2.85	2.9	2.9	1.85	1.4	1.55	1.25
10	1.85	1.5	1.65	2.5	3.45	2.65	2.75	2.45	1.95	1.35	1.75	1.25
11	1.75	1.55	1.7	4.95	2.85	2.55	2.45	2.15	2.25	1.35	1.6	1.4
12	1.75	1.45	1.65	8.2	2.65	2.45	2.35	1.95	1.95	1.35	4.1	1.4
13	1.65	1.55	2.2	4.5	8.65	2.35	2.15	1.85	1.9	1.35	2.55	1.35
14	1.7	1.55	2.1	3.5	3.7	2.35	2.1	2.15	1.75	1.3	2.85	1.3
15	1.6	3.25	2.15	2.7	3.15	4.5	2.05	2.15	1.7	1.25	2.85	4.25
16	1.6	3.3	2.45	2.55	2.75	3.35	1.95	2.1	2.95	1.25	1.95	2.9
17	1.6	2.45	5.25	2.4	2.55	2.95	1.9	2.05	2.35	1.3	1.85	2.15
18	1.55	2.2	6.5	2.35	2.55	2.35	2.1	1.9	2.15	1.4	1.9	1.95
19	1.6	2.15	4.0	2.3	2.5	2.65	1.95	1.85	2.0	3.15	1.55	1.75
20	1.9	2.85	2.95	2.15	2.35	2.6	1.85	1.75	2.65	2.25	1.5	1.65
21	1.95	2.7	2.6	3.55	2.35	2.65	1.8	1.65	3.05	1.9	1.45	1.6
22	1.9	2.35	2.25	3.0	2.25	5.55	1.85	1.6	2.85	1.75	1.5	1.55
23	1.75	2.2	2.2	3.35	2.15	3.55	1.85	1.65	2.5	1.7	1.45	1.5
24	1.7	2.0	2.1	2.9	2.2	2.9	1.85	1.8	2.25	1.55	1.45	1.45
25	1.6	1.85	2.05	2.55	6.95	2.6	1.85	1.75	2.25	1.5	1.4	1.45
26	1.55	1.85	2.25	2.35	4.55	2.55	2.0	2.35	2.15	1.45	1.35	1.5
27	1.6	1.8	2.25	2.3	2.95	2.35	2.2	2.15	1.95	1.45	1.4	1.4
28	1.55	1.9	3.0	2.2	2.55	2.35	2.15	1.95	1.8	1.5	1.35	1.35
29	1.6	1.8	4.75	2.45	2.55	2.95	2.6	2.3	1.7	1.35	1.35	2.55
30	1.5	1.75	3.1	5.6	.....	2.9	2.35	2.25	1.65	1.35	1.35	2.25
31	1.5	.....	2.65	3.35	.....	2.8	.....	2.25	.....	1.3	1.45	.....

BUFFALO CREEK AT BARRACKVILLE, W. VA.

LOCATION.—At steel highway bridge about 1,000 feet above covered highway bridge at Barrackville, Marion County, 2¾ miles northwest of Fairmont. Finchs Run enters on left about 1,600 feet below station.

DRAINAGE AREA.—115 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 8, 1915, to September 30, 1916; June 3, 1907, to December 31, 1908.

GAGE.—Chain gage fastened to downstream handrail of bridge; read by E. M. Beall.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading. Stay wire is used for measurements at high stages.

CHANNEL AND CONTROL.—One channel at all stages; straight about 100 feet above and below station. Both banks high. Stream bed rocky; some gravel. Control probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.3 feet at 5 p. m. March 22, 1916 (discharge, about 3,800 second-feet); minimum stage, 0.53 foot evening August 2 and morning August 3, 1916 (discharge, 0.6 second-foot).

Flood of July, 1912, reached a stage represented by about 16 feet on present gage.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice in January, 1916. Rating curve well defined below 1,600 second-feet; above this point curve is an extension. Gage read to hundredths, twice daily on week days and once on Sundays during 1915 and 1916, and daily in the morning to tenths during 1907 and 1908. Daily discharge ascertained by applying mean daily and daily gage heights to rating table except as follows: Creek reported dry August 13–17, September 4–28, and September 30 to December 6, 1908; discharge interpolated because gage was not read June 7, 1915, January 23–26, April 26, July 4, 9, August 7, and September 11, 1916; discharge January 18–20, 1916, estimated, because of ice, at 90 second-feet. Results good.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

The following discharge measurement was made by wading by Lasley Lee:

September 26, 1916: Gage height, 0.73 foot; discharge, 2.5 second-feet.

Daily discharge, in second-feet, of Buffalo Creek at Barrackville, W. Va., for the years ending Sept. 30, 1907–1909 and 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1907.					1907.				
1	.....	54	105	42	16	202	78	54	78
2	.....	300	78	42	17	151	167	66	66
3	271	120	91	54	18	105	184	66	66
4	292	78	54	330	19	91	392	54	202
5	300	54	54	135	20	91	91	54	91
6	360	66	392	91	21	105	135	42	78
7	202	66	167	66	22	91	105	54	91
8	184	42	151	66	23	66	540	42	78
9	135	54	91	54	24	54	184	120	167
10	105	66	360	54	25	54	980	105	105
11	91	30	135	330	26	78	1,480	78	78
12	91	392	91	360	27	135	540	66	66
13	120	222	78	151	28	78	222	54	66
14	2,310	105	66	105	29	66	135	54	66
15	426	91	54	91	30	54	135	42	66
					31	.....	105	42	.....

Daily discharge, in second-feet, of Buffalo Creek at Barrackville, W. Va., for the years ending Sept. 30, 1907–1909 and 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1907–8.												
1	54	91	120	167	184	222	540	392	120	3	9	0.1
2	54	105	120	151	300	2,080	720	202	78	3	9	.1
3	54	1,530	91	135	300	720	360	360	66	91	3	.1
4	42	462	91	120	245	330	222	300	66	30	3	.0
5	222	245	105	271	271	222	167	3,150	66	19	1	.0
6	135	184	167	184	2,730	821	184	926	54	3	3	.0
7	91	222	91	184	426	672	151	980	42	3	1	.0
8	91	184	78	540	222	360	135	626	19	3	.1	.0
9	66	151	78	360	271	1,700	821	360	19	42	.1	.0
10	151	120	120	184	184	672	360	1,090	30	30	.1	.0
11	105	120	672	184	184	392	1,140	360	19	19	.1	.0
12	91	91	300	330	245	271	500	222	30	9	.1	.0
13	91	91	167	1,260	360	202	271	167	19	30	.0	.0
14	78	78	1,640	426	500	222	184	135	19	105	.0	.0
15	78	66	980	222	1,860	184	167	120	30	271	.0	.0
16	66	78	540	184	821	202	184	151	30	78	.0	.0
17	78	78	300	167	330	167	135	105	30	42	.0	.0
18	54	66	222	151	184	151	120	167	19	66	.1	.0
19	54	222	202	135	222	3,030	167	135	9	78	78	.0
20	54	151	135	135	582	582	135	167	19	66	42	.0
21	54	151	151	135	245	300	120	271	9	54	30	.0
22	54	135	135	135	222	202	105	167	9	42	19	.0
23	54	120	1,040	105	184	184	105	120	9	19	19	.0
24	54	1,480	720	151	135	222	105	78	9	19	9	.0
25	42	873	330	167	135	184	91	120	54	91	9	.0
26	42	392	222	105	770	151	105	91	19	91	19	.0
27	42	271	167	1,420	770	135	91	91	9	91	9	.0
28	120	184	151	330	300	135	78	78	3	54	9	.0
29	271	151	151	271	222	202	78	78	3	42	3	.1
30	151	120	120	167	.....	582	78	821	9	30	1.0	.0
31	105	.....	222	184	.....	626	.....	245	.....	19	1.0	.....

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1908–9.				1908–9.				1908–9.			
1	0.0	0.0	0.0	11	0.0	0.0	19	21	0.0	0.0	42
2	.0	.0	.0	12	.0	.0	78	22	.0	.0	30
3	.0	.0	.0	13	.0	.0	120	23	.0	.0	30
4	.0	.0	.0	14	.0	.0	66	24	.0	.0	19
5	.0	.0	.0	15	.0	.0	42	25	.0	.0	19
6	.0	.0	.0	16	.0	.0	30	26	.0	.0	19
7	.0	.0	.1	17	.0	.0	30	27	.0	.0	19
8	.0	.0	.1	18	.0	.0	30	28	.0	.0	19
9	.0	.0	54	19	.0	.0	151	29	.0	.0	19
10	.0	.0	30	20	.0	.0	66	30	.0	.0	19
								31	.0	.....	19

Daily discharge, in second-feet, of Buffalo Creek at Barrackville, W. Va., for the years ending Sept. 30, 1907–1909 and 1915 and 1916—Continued.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1915.						1915.					
1	.....	184	3.0	1.3	12	16	19	58	5.9	2.5	4.3
2	.....	128	3.2	1.5	5.9	17	19	42	7.2	2.7	4.1
3	.....	345	3.6	3.4	4.0	18	15	29	5.0	2.4	8.0
4	.....	212	4.3	3.5	3.6	19	6.5	20	4.1	2.7	151
5	.....	120	15	2.9	3.4	20	8.0	15	3.2	3.2	71
6	.....	78	32	2.7	2.9	21	12	13	2.8	3.3	44
7	.....	69	17	2.3	2.8	22	245	9.8	2.6	3.1	32
8	49	60	16	12	2.6	23	540	6.5	2.0	2.9	20
8	44	46	17	8.9	2.6	24	184	4.1	1.8	2.8	12
10	32	35	16	16	3.2	25	105	3.4	1.7	5.9	5.9
11	23	24	8.0	4.3	14	26	73	3.2	1.6	4.6	4.6
12	23	71	8.0	4.1	19	27	78	3.8	1.6	4.0	5.4
13	38	47	4.3	5.0	17	28	54	3.1	1.4	15	4.3
14	31	54	3.7	3.7	14	29	202	2.8	2.1	23	7.2
15	22	50	3.3	3.2	6.5	30	1,800	3.0	2.4	26	5.4
						31	672	.....	1.7	15	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	1,310	15	34	481	1,580	132	134	97	61	24	0.9	3.6
2	626	13	32	2,580	481	176	126	77	40	24	.7	3.5
3	176	12	32	426	271	176	106	82	111	18	.6	3.3
4	86	10	35	184	202	129	97	114	117	13	.9	2.8
5	60	8.0	34	151	184	143	84	151	61	7.2	1.4	2.5
6	61	6.5	32	462	176	222	72	112	44	5.9	330	2.0
7	40	6.5	30	300	1,090	1,040	62	582	300	4.3	175	2.1
8	30	8.9	28	143	271	500	92	462	345	5.0	20	2.8
9	23	7.2	35	91	222	234	258	409	143	4.4	37	71
10	19	8.9	32	101	159	159	409	167	167	3.7	26	26
11	15	5.4	28	444	151	123	245	124	462	2.7	12	15
12	10	8.0	21	1,360	426	101	167	83	159	1.5	444	4.3
13	8.9	12	40	926	2,610	126	124	64	87	1.1	245	3.5
14	6.5	15	61	426	481	300	104	54	58	2.9	44	3.2
15	4.6	1,040	42	167	176	1,260	92	50	202	20	20	23
16	4.6	392	58	151	184	500	70	42	462	11	13	35
17	3.8	143	1,700	111	184	286	71	40	212	5.9	9.8	19
18	4.1	86	2,430	.....	376	193	65	32	130	11	7.2	11
19	520	315	582	.....	258	167	54	26	105	90	4.1	4.3
20	212	444	360	.....	193	126	48	21	98	27	3.8	3.4
21	108	245	143	176	212	135	49	15	873	12	3.2	2.8
22	64	134	86	345	176	3,090	66	15	672	9.8	3.0	2.6
23	49	91	90	296	143	540	59	19	159	9.8	3.2	3.0
24	40	73	81	248	132	245	65	23	110	11	3.6	2.7
25	30	62	97	199	2,190	176	66	16	376	16	2.7	2.6
26	34	50	151	151	481	134	139	19	122	7.2	1.2	2.3
27	36	50	129	102	234	126	212	35	74	5.0	1.6	2.0
28	30	44	426	92	159	151	176	35	48	3.7	5.9	1.8
29	29	46	2,430	98	143	286	167	159	36	2.9	23	3.3
30	22	40	770	672	.....	222	130	117	29	2.1	13	8.9
31	18	.....	271	500	.....	167	.....	116	.....	1.2	4.6	.....

Monthly discharge of Buffalo Creek at Barrackville, W. Va., for the years ending Sept. 30, 1907–1909 and 1915 and 1916.

[Drainage area, 115 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
June 3–30	2,310	54	230	2.00	2.01
July	1,480	30	233	2.03	2.34
August	392	42	95.5	.830	.96
September	360	42	111	.965	1.08
1907–08.					
October	271	42	87.0	0.757	0.87
November	1,530	66	274	2.38	2.66
December	1,640	78	311	2.70	3.11
January	1,420	105	279	2.43	2.80
February	2,730	135	462	4.02	4.34
March	3,030	135	520	4.52	5.21
April	1,140	78	254	2.21	2.47
May	3,150	78	396	3.44	3.97
June	120	3	30.6	.266	.30
July	271	3	49.8	.433	.50
August	78	0	8.95	.078	.09
September	0.1	0	.01	.0001	.0001
The year	3,150	0	222	1.93	26.32
1908.					
October	0	0	0	0	0
November	0	0	0	0	0
December	151	0	31.3	.272	.31
1915.					
May 8–31	1,800	6.5	179	1.56	1.39
June	345	2.8	58.0	.504	.56
July	32	1.4	6.50	.057	.07
August	26	1.3	6.25	.054	.06
September	151	2.6	16.4	.143	.16
1915–16.					
October	1,310	3.8	119	1.03	1.19
November	1,040	5.4	113	.983	1.10
December	2,430	21	333	2.90	3.34
January	2,580	.....	376	3.27	3.77
February	2,610	132	467	4.06	4.38
March	3,090	101	367	3.19	3.68
April	409	48	120	1.04	1.16
May	582	15	108	.939	1.08
June	873	29	195	1.70	1.90
July	90	1.1	11.7	.102	.12
August	444	.6	47.1	.410	.47
September	71	1.8	9.11	.079	.09
The year	3,090	.6	188	1.63	22.28

CHEAT RIVER NEAR PARSONS, W. VA.

LOCATION.—At the Moss highway bridge, 2 miles north of Parsons, Tucker County, 2 miles below the junction of Shavers Fork, and 5 miles below the junction of Dry Fork and Blackwater River.

DRAINAGE AREA.—716 square miles (determined by Hydroelectric Co. of West Virginia).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1916.

GAGE.—Chain gage near center of bridge on downstream guard rail; read by Mrs. E. C. Linger.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge.

CHANNEL AND CONTROL.—Rocky and probably permanent. Water swift and turbulent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.05 feet at 7 a. m. January 12 (discharge, 24,900 second-feet); minimum stage, 1.36 feet at 6 p. m. November 1 (discharge, 46 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—Some regulation above at various pulp mills and sawmills. Effect probably compensating, so that two gage readings per day give correct basis for determining discharge.

ACCURACY.—Stage-discharge relation practically permanent, affected by ice in December, 1915. Rating curve fairly well defined between 130 and 5,500 second-feet. Beyond these limits the curve is an extension. Gage read twice daily to quarter tenths. Daily discharge ascertained by applying mean gage heights to rating table. Determination of discharge December 8 to 16 may be a little large, as correction for effect of ice on gage readings was not made. Results good.

COOPERATION.—Station maintained in cooperation with the Hydroelectric Co. of West Virginia.

Discharge measurements of Cheat River near Parsons, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 25	J. E. Stewart	4.71	2,770
28	do	5.70	4,640
Sept. 15	L. Lee	5.83	4,620

Daily discharge, in second-feet, of Cheat River near Parsons, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18,100	50	865	6,090	6,090	580	695	1,410	1,010	610	320	118
2	7,660	181	778	12,900	5,290	531	484	1,290	625	484	290	118
3	5,880	215	695	5,880	4,370	497	960	2,190	1,010	2,190	276	101
4	4,020	142	625	1,820	3,510	504	820	1,740	1,600	1,890	504	87
5	3,000	122	545	1,120	3,000	625	573	1,410	865	865	1,410	78
6	2,510	99	504	2,120	3,170	566	445	1,180	655	618	2,120	68
7	2,120	122	471	2,430	4,020	9,600	409	1,960	735	497	1,670	115
8	1,820	865	478	2,430	3,340	7,900	504	2,430	865	409	910	133
9	1,350	618	427	2,120	2,670	5,680	1,120	1,960	1,010	385	960	110
10	960	478	409	2,350	2,120	4,190	1,060	1,410	1,120	433	735	203
11	352	391	409	9,350	1,890	1,670	1,180	1,180	1,180	504	640	188
12	244	484	315	21,500	2,430	5,480	2,670	1,010	865	433	1,060	148
13	211	573	295	10,600	17,500	10,100	2,350	865	580	352	2,270	110
14	174	1,180	285	8,140	8,140	14,400	3,170	820	595	409	2,120	95
15	136	2,830	253	5,480	2,830	14,400	2,350	610	524	363	820	4,910
16	108	2,830	223	4,020	2,430	12,900	1,960	471	2,830	330	865	4,370
17	79	2,350	5,290	3,170	2,040	11,200	2,430	610	3,000	1,670	188	2,830
18	64	2,190	17,500	2,830	1,670	8,140	2,270	374	1,820	2,190	610	1,600
19	5,100	1,350	10,900	2,510	1,470	5,100	1,410	820	1,740	1,600	421	820
20	3,510	1,350	9,350	2,040	1,350	1,230	1,010	538	1,600	865	358	458
21	2,670	2,120	7,660	1,890	1,120	2,270	695	625	2,350	695	290	341
22	1,740	1,890	6,300	3,000	910	22,100	1,120	778	3,000	695	244	271
23	1,120	1,670	5,480	4,370	778	10,400	910	1,010	1,890	655	433	211
24	820	1,470	5,100	3,850	820	4,550	735	1,120	1,120	735	358	154
25	497	1,410	3,680	3,000	735	2,830	3,340	1,010	8,140	632	336	125
26	471	1,290	3,850	1,820	610	2,510	4,020	648	3,170	510	305	108
27	397	1,180	2,670	1,410	504	2,430	3,850	1,010	1,600	524	244	89
28	285	865	1,180	1,230	433	4,190	3,170	695	1,060	545	219	115
29	184	1,010	5,290	1,060	421	4,370	2,350	778	820	566	199	15,600
30	89	910	7,200	11,200	.....	3,340	1,740	1,180	695	433	174	6,970
31	64	.....	6,520	7,200	.....	1,230	.....	1,410	.....	363	154	.....

Monthly discharge of Cheat River near Parsons, W. Va., for the year ending Sept. 30, 1916.

[Drainage area, 716 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	18,100	64	2,120	2.96	3.41
November	2,830	50	1,070	1.49	1.66
December	17,500	.....	3,400	4.75	5.48
January	21,500	1,060	4,800	6.70	7.72
February	17,500	421	2,950	4.12	4.44
March	22,100	497	5,660	7.91	9.12
April	4,020	409	1,660	2.32	2.59
May	2,430	374	1,110	1.55	1.79
June	8,140	524	1,600	2.23	2.49
July	2,190	330	756	1.06	1.22
August	2,270	154	694	.969	1.12
September	15,600	68	1,350	1.89	2.11
The year	21,500	50	2,270	3.17	43.15

CHEAT RIVER AT ROWLESBURG, W. VA.

LOCATION.—At the Baltimore & Ohio Railroad bridge at Rowlesburg, Preston County, about 300 feet above mouth of Salt Lick Creek.

DEAINAGE AREA.—960 square miles (includes drainage area of Salt Lick Creek).

RECORDS AVAILABLE.—July 19, 1912, to September 30, 1916. The United States Weather Bureau has collected gage-height records since 1884.

GAGE.—Mott tape gage attached to upstream side of bridge; read by J. F. Pierce.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge. Salt Lick Creek is measured separately and the discharge added to that measured at the bridge.

CHANNEL AND CONTROL.—Stream is curved above and below bridge; control consists of small boulders; probably permanent. Salt Lick Creek enters between the control and the gage.

EXTREMES OF STAGE.—Maximum stage recorded during year, 11.5 feet January 12; minimum stage, 1.8 feet November 6.

The highest stage of which there is any record occurred, according to the records of the United States Weather Bureau, on July 10, 1888, when the water reached a stage of 22 feet.

ICE.—Stage-discharge relation affected by ice during extremely cold weather.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during 1915–16. Data inadequate for determining rating curve. Gage read daily in the morning to tenths.

COOPERATION.—Gage-height record furnished by the United States Weather Bureau.

Discharge measurements of Cheat River at Rowlesburg, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 25	B. E. Jones	4.53	3,720	Sept. 30	L. Lee	5.14	5,450
Sept. 21	L. Lee	2.50	390	30	.....do.....	4.84	4,770

Daily gage height, in feet, of Cheat River at Rowlesburg, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.8	2.0	3.1	4.6	5.5	3.6	4.0	3.9	3.4	2.9	2.4	2.5
2	8.1	2.0	3.0	9.1	5.7	3.4	3.9	3.6	3.1	2.8	2.2	2.7
3	5.8	2.0	2.9	6.6	4.8	3.5	3.7	3.5	2.9	2.7	2.2	2.9
4	4.6	1.9	2.9	5.1	4.2	3.4	4.2	3.4	3.7	3.9	2.3	2.7
5	4.1	1.9	2.8	4.3	3.9	3.2	4.0	3.6	3.3	3.4	3.6	2.6
6	3.8	1.8	2.8	4.2	3.8	3.2	3.8	3.4	3.0	3.0	4.5	2.5
7	3.8	2.5	2.7	4.5	4.9	4.0	3.7	3.5	2.9	2.8	3.9	2.5
8	3.6	3.1	2.7	3.9	4.7	7.7	3.5	4.5	3.0	2.6	3.5	2.3
9	3.3	3.0	2.7	3.6	4.2	5.5	3.5	4.2	3.2	2.2	5.0	2.4
10	3.0	2.9	2.7	3.7	4.0	4.4	3.4	4.0	3.2	2.5	3.2	2.3
11	3.0	2.8	2.6	6.2	3.7	3.9	3.9	3.7	3.3	2.6	2.9	2.3
12	2.9	2.7	2.6	11.5	3.6	3.7	4.7	3.4	3.2	2.6	2.9	2.2
13	2.8	2.7	2.6	6.9	10.2	3.5	4.8	3.2	3.0	2.5	3.2	2.3
14	2.7	3.2	2.7	5.8	6.6	4.9	4.4	3.0	2.9	2.3	4.2	2.2
15	2.6	4.5	2.5	4.7	5.2	8.5	4.5	3.2	2.7	2.6	3.5	4.6
16	2.6	6.2	2.4	4.3	4.3	5.2	4.3	3.2	2.9	2.4	3.0	4.96
17	2.5	4.6	3.8	3.6	4.0	4.5	3.9	3.5	5.0	2.3	3.2	3.66
18	2.5	4.1	9.4	3.2	3.8	4.2	4.2	3.5	4.4	4.0	2.9	3.06
19	2.4	3.2	7.5	3.2	3.6	3.9	3.8	3.4	3.7	3.9	2.7	3.36
20	5.1	4.0	5.4	3.2	3.2	3.7	3.6	3.2	4.0	3.3	2.7	2.76
21	4.2	4.4	4.5	5.1	3.5	3.6	3.4	3.0	3.8	2.8	2.5	2.26
22	4.2	4.4	3.8	4.9	3.7	4.5	3.4	2.9	5.0	3.0	2.6	2.3
23	3.5	4.0	3.8	5.5	3.6	8.2	3.8	2.8	4.3	3.5	2.8	2.3
24	3.2	3.7	3.5	4.8	3.6	5.8	3.7	3.0	3.6	3.1	2.8	2.3
25	3.0	3.5	3.4	4.2	3.8	4.7	3.9	3.5	5.5	2.9	3.0	2.2
26	2.8	3.3	3.8	3.9	3.8	4.3	5.7	3.0	5.3	2.8	2.8	2.2
27	2.5	3.2	3.6	3.6	3.6	4.0	5.2	2.9	4.2	2.6	2.6	2.1
28	2.3	3.2	5.6	3.4	3.6	5.0	4.8	3.3	3.6	2.8	2.8	2.1
29	2.4	3.2	5.6	3.5	3.6	4.9	4.5	3.1	3.3	2.7	2.8	2.7
30	2.4	3.2	7.8	6.8	.....	4.7	4.2	3.0	3.0	2.6	2.6	5.4
31	2.2	.....	5.5	6.2	.....	4.4	.....	3.4	.....	2.5	2.5	.....

NOTE.—Gage lost in river; gage heights estimated by observer Sept. 1–16, inclusive.

CHEAT RIVER NEAR MORGANTOWN, W. VA.

LOCATION.—At highway bridge at Uneva, Monongalia County, 10 miles above mouth of river. Parallel of 39° 40′ crosses the river at this bridge.

DRAINAGE AREA.—1,380 square miles.

RECORDS AVAILABLE.—July 8 to December 30, 1899; July 1 to December 29, 1900; August 21, 1902, to December 31, 1905; November 18, 1908, to September 30, 1916.

GAGE.—Chain gage attached to bridge; read by C. F. Baker.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.4 feet at 8 a. m., February 13 (discharge, 34,500 second-feet); minimum stage, 2.06 feet at 8 a. m. and 5 p. m., September 27; (discharge, 276 second-feet.)

ICE.—Ice forms sometimes to a thickness of several inches, and large ice jams may affect the stage-discharge relation during short periods in December, January, and February.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice in 1915–16. Rating curve is well defined to 47,800 second-feet; above this point curve is an extension. Result of discharge measurement made September 22, 1915. considered too low on account of low velocity. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. Discharge interpolated on the following days when the gage was not read: October 24, December 4, 12, April 5, 8, 30, May 7, 13, 14, 21, 28, June 3, 6, and August 19. Results good.

The following discharge measurements were made by Lasley Lee; first one from bridge, second one by wading:

September 22, 1915: Gage height, 2.42 feet; discharge, 347 second-feet; September 29: Gage height, 2.43 feet; discharge 438 second-feet.

Daily discharge, in second-feet, of Cheat River near Morgantown, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,200	585	915	6,500	14,100	2,080	4,140	3,150	1,730	1,040	480	330
2	22,800	480	915	28,400	11,600	2,080	3,500	2,580	1,260	915	452	310
3	11,100	480	915	15,700	7,510	2,080	2,860	2,320	1,920	805	400	400
4	5,550	480	860	8,530	4,700	1,960	3,150	2,200	2,580	1,840	375	330
5	3,300	480	805	5,110	3,620	1,730	3,080	2,320	1,430	1,730	805	352
6	3,000	480	758	6,020	3,000	1,730	3,000	2,200	1,280	1,040	4,320	330
7	2,450	480	710	5,550	9,040	7,510	2,580	3,880	1,120	758	3,000	330
8	1,730	758	668	3,790	7,000	20,300	2,330	5,550	1,260	625	1,960	330
9	1,340	1,040	758	2,860	5,550	10,600	2,080	4,140	1,260	585	1,430	310
10	1,120	860	545	2,710	3,960	5,550	2,080	3,460	1,520	545	1,340	310
11	860	805	585	11,100	3,150	3,790	4,140	2,710	1,730	480	915	330
12	805	805	722	32,000	4,320	3,000	6,500	2,080	1,430	625	860	310
13	710	1,040	860	18,200	34,500	2,580	6,500	1,780	1,260	585	915	310
14	625	1,260	710	12,600	16,200	7,510	5,110	1,480	980	480	3,300	290
15	625	11,100	480	7,000	7,510	23,800	4,700	1,180	1,120	480	1,730	2,320
16	512	13,100	585	5,110	5,110	13,600	4,320	1,430	2,080	452	1,120	6,500
17	545	6,020	8,530	3,620	3,790	7,000	3,000	1,840	8,020	512	1,040	2,200
18	545	3,620	33,500	2,580	3,300	4,700	3,300	2,710	6,020	1,340	915	1,180
19	585	3,620	20,300	1,730	2,710	3,790	2,860	1,840	3,460	2,710	750	805
20	6,020	7,510	10,100	1,430	2,080	2,860	2,200	1,430	3,960	1,340	585	585
21	3,300	9,550	5,110	4,700	2,200	2,580	1,840	1,200	7,000	805	425	480
22	2,080	4,320	3,300	7,510	2,710	15,200	1,960	980	9,040	915	512	452
23	1,430	3,460	2,580	9,040	2,580	23,300	2,580	980	5,550	1,620	915	452
24	1,240	2,580	2,320	7,000	2,580	12,100	2,710	980	3,150	1,040	668	352
25	1,040	2,080	1,730	4,510	3,960	7,000	3,300	1,260	17,200	860	512	330
26	860	1,620	3,150	3,000	3,620	4,700	10,600	1,180	10,100	758	452	310
27	805	1,430	3,000	2,710	3,150	4,320	9,550	980	4,700	710	425	272
28	758	1,340	3,300	2,320	2,200	7,000	7,000	1,120	2,580	585	400	290
29	758	1,340	20,300	6,210	2,080	8,020	4,510	1,260	1,840	668	400	352
30	668	1,120	20,800	10,100	.....	12,100	3,830	1,260	1,260	625	352	8,020
31	625	.....	10,600	13,600	.....	5,550	.....	1,520	.....	512	352	.....

Monthly discharge of Cheat River near Morgantown, W. Va., for the year ending Sept. 30, 1916.

[Drainage area, 1,380 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	22,800	512	2,580	1.87	2.16
November	13,100	480	2,790	2.02	2.25
December	33,500	480	5,170	3.75	4.32
January	32,000	1,430	8,100	5.87	6.77
February	34,500	2,080	6,130	4.44	4.79
March	23,800	1,730	7,420	5.38	6.20
April	10,600	1,849	3,980	2.88	3.21
May	5,550	980	2,030	1.47	1.70
June	17,200	980	3,590	2.60	2.90
July	2,710	452	903	.654	.75
August	4,320	352	1,040	.754	.87
September	8,020	272	982	.712	.79
The year	34,500	272	3,720	2.70	36.71

BLACKWATER RIVER AT HENDRICKS, W. VA.

LOCATION.—At highway bridge at Hendricks, Tucker County, about one-eighth mile above mouth of river.

DRAINAGE AREA.—148 square miles (determined by West Virginia Development Co.).

RECORDS AVAILABLE.—October 13, 1911, to September 30, 1916.

GAGE.—Chain gage attached to upstream side of bridge; read by French Shaffer.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Coarse gravel and stones.

EXTREMES OF STAGE.—Maximum stage recorded during year, 7.4 feet at 7 a. m. December 18; minimum stage, 1.78 feet at 5 p. m. September 28.

1911–1915: Maximum stage recorded, 6.8 feet at 8 a. m. February 2, 1915 (discharge estimated at 7,840 second-feet); minimum stage, 1.8 feet August 11, September 1-6, 1913; June 2–4, 17–22, July 8–9, 12, August 24, September 7-8, 1914; June 27–28, 1915 (discharge estimated at 25 second-feet).

Maximum flood occurred July 10, 1888; stage unknown.

ICE.—Stage-discharge relation probably affected by ice during extremely cold weather.

ACCURACY.—Station was first visited by engineers of the Survey in March, 1916. Current-meter measurements made at gage heights 3.42 and 4.27 during this visit show a discharge respectively 17 and 30 per cent less than that indicated by the same gage height on the rating curve used from 1911 to 1914. Record of monthly discharge as published in Water-Supply Paper 383 probably as accurate as indicated. Discharge data subsequent to 1914 withheld for additional information. Gage read twice daily to tenths to April 1, then to hundredths.

COOPERATION.—Station maintained and records furnished by the Hydroelectric Co. of West Virginia.

Discharge measurements of Blackwater River at Hendricks, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 26	J. E. Stewart	3.42	616
28	....do	4.27	1,120
Sept. 14	L. Lee	1.85	26.3

Daily gage height, in feet, of Blackwater River at Hendricks, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.0	2.3	2.55	4.35	4.25	2.5	2.8	2.72	2.22	2.49	1.9	1.92
2	5.4	2.25	2.6	5.8	3.65	2.55	2.78	2.69	2.18	2.3	1.92	2.08
3	3.95	2.1	2.5	4.6	3.3	2.55	3.05	2.64	2.75	2.78	1.92	2.05
4	3.15	2.05	2.55	3.55	2.95	2.3	3.35	2.9	2.68	2.48	1.98	1.96
5	3.25	2.35	2.45	3.0	2.9	2.3	2.92	2.68	2.4	2.28	1.97	1.92
6	3.15	2.45	2.35	3.35	3.15	2.4	2.76	2.54	2.2	2.14	2.51	1.86
7	2.85	2.55	2.3	3.0	4.0	5.5	2.64	3.3	2.24	2.09	2.1	1.88
8	2.6	2.6	2.25	2.65	3.55	4.45	2.58	3.05	2.46	2.09	2.04	1.94
9	2.55	2.4	2.2	2.6	3.1	3.45	2.62	3.15	2.34	2.2	2.32	2.03
10	2.5	2.3	2.2	2.85	2.8	3.1	2.55	2.8	2.62	2.18	2.06	2.0
11	2.55	2.2	2.1	5.4	2.55	2.85	3.35	2.67	2.5	2.17	2.0	1.99
12	2.35	2.25	2.15	6.2	4.6	2.7	3.3	2.62	2.28	2.12	2.16	2.0
13	2.45	2.5	2.2	5.0	6.1	2.65	3.3	2.5	2.05	2.08	3.14	1.88
14	2.35	2.55	2.2	4.2	4.45	4.85	3.25	2.4	2.18	2.4	2.86	1.86
15	2.25	4.65	2.2	3.3	3.15	5.2	3.35	2.48	2.16	2.14	2.37	4.5
16	2.85	3.65	2.25	3.0	2.9	3.55	2.96	2.46	2.4	2.1	2.8	2.9
17	2.35	3.2	5.05	2.85	2.9	3.1	3.1	3.26	3.65	2.75	2.52	2.42
18	2.3	2.6	6.8	2.8	2.7	2.75	2.98	2.73	2.9	3.5	2.18	2.19
19	4.55	3.8	4.75	2.8	2.7	2.75	2.75	2.49	2.91	2.84	2.1	2.05
20	3.8	3.65	3.75	2.9	2.65	2.7	2.65	2.4	3.0	2.26	2.1	2.0
21	3.1	3.5	3.0	3.8	2.6	2.7	2.6	2.35	3.45	2.17	2.04	2.0
22	2.8	3.25	2.95	3.8	2.75	5.8	3.2	2.3	3.75	2.16	2.99	1.95
23	2.5	2.95	2.8	3.7	2.7	5.2	3.0	2.66	2.95	2.14	2.45	1.97
24	2.4	2.75	2.65	3.15	2.85	3.75	3.15	2.49	2.46	2.2	2.3	1.94
25	2.45	2.6	2.8	2.85	2.65	3.15	4.0	2.36	5.5	2.23	2.14	1.92
26	2.4	2.6	2.95	2.8	2.45	3.2	4.1	2.26	3.9	2.15	2.06	1.88
27	2.45	2.6	2.85	2.7	2.4	3.15	3.7	2.18	3.5	2.14	2.0	1.88
28	2.4	2.6	3.55	2.8	2.4	4.15	3.3	2.18	2.6	2.12	2.12	1.82
29	2.35	2.6	5.15	3.25	2.55	3.65	3.1	2.34	2.52	2.05	2.12	3.8
30	2.2	2.5	4.4	4.5	.....	3.3	2.88	2.28	2.36	1.92	2.04	3.3
31	2.3	.....	3.55	4.15	.....	3.05	.....	2.42	.....	1.92	2.0	.....

SHAVERS FORK AT PARSONS, W. VA.

LOCATION.—At steel highway bridge 600 feet northwest of the railroad station at Parsons, Tucker County, and one-half mile above confluence with Dry Fork.

DRAINAGE AREA.—210 square miles (determined by Pittsburgh Flood Commission).

RECORDS AVAILABLE.—October 14, 1910, to September 30, 1916.

GAGE.—Standard chain gage attached to bridge, read by R. W. Evans. Sea-level elevation of zero of gage, 1,631.70 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel rocky. Control, coarse gravel and rocks; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.0 feet at 6 p. m. October 1 (discharge, 10,100 second-feet); minimum stage, 2.55 feet September 28 (discharge, 24 second-feet).

High waters of 1888 and 1907 reached a stage represented by approximately 12.5 feet, referred to present gage datum.

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—The flow at low stages may be affected by the storage of water at a pulp-mill dam about three-fourths mile above the station.

ACCURACY.—Stage-discharge relation practically permanent, affected by ice in December and January. Rating curve well defined between 40 and 7,700 second-feet, beyond these limits curve is an extension. Gage read twice daily to tenths. Daily discharge ascertained by applying mean daily gage heights to rating table. Discharge interpolated on following days when gage was not read: October 16, 17, December 11, June 5, 20, and August 13; estimated because of ice: December 15, 16, and January 18; estimated on August 3 and 4 when gage was not read. Results good.

Discharge measurements of Shavers Fork at Parsons, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 25	J. E. Stewart	4.12	927	Mar. 29	J. E. Stewart	4.58	1,380
28	.....do	4.99	1,880	Sept. 14	Lasley Lee	2.80	56.6

Daily discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,470	183	144	2,510	1,860	264	700	605	380	183	144	68
2	3,350	164	113	6,110	1,520	295	700	440	330	183	183	52
3	1,390	144	88	1,930	905	295	605	380	365	295	180	88
4	700	88	88	905	562	264	562	440	365	700	350	88
5	605	100	88	652	520	183	48	456	299	233	700	88
6	440	88	113	605	520	295	440	380	233	233	905	113
7	520	88	88	700	1,200	2,830	402	520	183	183	700	68
8	480	144	78	440	750	2,830	365	652	233	100	402	52
9	295	100	88	295	520	800	440	365	233	113	295	52
10	183	113	88	330	440	1,520	295	480	365	113	183	68
11	128	128	78	3,170	365	1,390	295	365	295	233	183	52
12	144	144	68	4,470	1,930	1,390	800	208	264	144	233	46
13	144	183	68	1,930	3,000	365	905	233	183	233	233	39
14	144	233	52	1,520	1,460	1,520	905	183	183	68	233	42
15	113	330	50	905	750	3,530	700	183	233	113	183	1,320
16	118	233	50	800	520	3,170	700	175	183	233	183	365
17	123	264	1,660	605	402	1,860	750	605	233	700	295	233
18	128	233	6,110	400	440	1,460	605	295	700	905	233	183
19	365	264	2,670	233	365	1,790	520	208	700	402	113	183
20	1,080	233	852	330	295	605	440	164	802	183	100	88
21	852	144	652	330	365	295	365	113	905	183	113	88
22	700	208	440	1,520	330	2,360	380	183	1,020	295	88	113
23	520	164	365	1,140	365	1,460	440	119	1,020	113	365	113
24	520	144	233	800	295	1,020	605	113	295	183	365	88
25	440	144	233	605	365	1,020	1,020	144	1,390	295	88	60
26	233	144	365	480	440	1,020	750	208	905	144	52	52
27	233	144	365	365	440	905	1,020	1,020	800	233	68	39
28	233	183	562	402	365	1,930	1,020	233	183	164	68	24
29	183	164	2,070	440	365	1,260	800	295	144	144	52	1,520
30	233	144	2,830	3,170	.....	960	700	520	233	183	68	1,200
31	233	.....	1,460	1,590	.....	1,140	.....	605	.....	183	52	.....

Monthly discharge of Shavers Fork at Parsons, W. Va., for the year ending Sept. 30, 1916.

[Drainage area, 210 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	4,470	113	623	2.97	3.42
November	330	88	168	.800	.89
December	6,110	a 50	716	3.41	3.93
January	6,110	233	1,280	6.10	7.03
February	3,000	295	747	3.56	3.84
March	3,530	183	1,290	6.14	7.08
April	1,020	295	624	2.97	3.31
May	1,020	113	351	1.67	1.92
June	1,390	144	455	2.17	2.42
July	905	68	247	1.18	1.36
August	905	52	239	1.14	1.31
September	1,520	24	220	1.05	1.17
The year	6,110	24	582	2.77	37.68

a Estimated.

BIG SANDY CREEK AT ROCKVILLE, W. VA.

LOCATION.—At the highway bridge at Rockville, in Preston County, about 5 miles above mouth of creek and 6 miles below Bruceton Mills.

DRAINAGE AREA.—202 square miles (determined by West Virginia Development Co.).

RECORDS AVAILABLE.—May 7, 1909, to September 30, 1916.

GAGE.—Chain gage attached to downstream side of bridge, read by Mrs. W. O. Walls.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel bed consists of bowlders and bed rock. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.85 feet at 5 p. m. March 22 (discharge, about 17,000 second-feet); minimum stage, 2.7 feet September 14 (discharge, 3 second-feet).

ICE.—Stage-discharge relation affected by ice during periods of extremely cold weather.

REGULATION.—Gristmills at Rockville, Clifton Mills, and Bruceton Mills, operated by water power, may produce fluctuations in stage during low water.

ACCURACY.—Stage-discharge relation practically permanent. Not materially affected by ice this year. Rating curve well defined between 10 and 8,000 second-feet; beyond these limits curve is an extension. Measurement made September 24, 1915, not considered reliable on account of low velocity. Gage read twice daily to tenths. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

The following discharge measurement was made by wading by Lasley Lee: September 24, 1915: Gage height, 3.21, discharge, 9.5 second-feet.

Daily discharge, in second-feet, of Big Sandy Creek at Rockville, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,100	47	98	862	3,390	314	429	330	228	150	16	15
2	2,220	45	85	5,130	1,690	269	931	269	228	118	14	11
3	739	45	91	1,310	739	284	1,010	255	429	98	9.6	15
4	362	51	74	1,200	523	362	862	284	299	79	17	14
5	255	51	79	465	447	269	543	346	241	68	49	8.6
6	191	56	68	465	543	503	284	543	241	63	1,010	7.4
7	150	203	74	862	412	269	203	862	378	63	330	8.0
8	118	169	85	633	503	378	169	586	429	58	111	17
9	91	104	79	395	503	346	169	543	412	55	56	21
10	79	68	79	1,560	412	314	346	429	362	55	56	17
11	85	54	85	739	412	269	395	284	330	49	74	21
12	49	85	79	2,780	1,010	215	586	203	314	47	133	14
13	33	150	68	2,500	862	395	465	160	241	47	79	8.6
14	29	169	74	1,010	798	269	484	150	142	43	191	4.0
15	26	3,390	68	543	739	378	395	160	191	38	68	49
16	26	3,390	74	484	633	395	346	586	1,690	29	74	63
17	21	1,820	4,760	412	465	1,560	299	395	1,430	29	68	68
18	23	862	8,810	362	412	798	255	255	684	33	74	38
19	111	284	1,010	284	412	429	228	228	523	47	56	23
20	126	543	633	330	395	395	228	203	633	41	41	15
21	111	739	586	862	346	378	215	160	2,930	35	31	14
22	98	862	484	862	346	11,900	228	160	1,950	27	26	10
23	79	447	465	739	330	3,230	299	142	633	29	18	8.4
24	79	378	447	543	429	1,200	378	142	465	27	10	11
25	68	299	633	412	1,010	739	378	142	429	35	7.4	10
26	58	241	633	346	684	503	633	126	395	45	4.8	14
27	58	191	633	284	465	1,010	1,820	111	395	47	17	14
28	56	160	862	395	412	1,010	739	98	314	38	38	11
29	51	133	4,760	862	362	862	503	98	255	31	79	26
30	45	104	1,950	1,820	.....	862	330	118	215	27	47	51
31	45	.....	633	1,010	.....	798	.....	169	.....	21	26	.....

Monthly discharge of Big Sandy Creek at Rockville, W. Va., for the year ending Sept. 30, 1916.

[Drainage area, 202 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	2,220	21	212	1.05	1.21
November	3,390	45	505	2.50	2.79
December	8,810	68	921	4.56	5.26
January	5,130	284	982	4.86	5.60
February	3,390	330	679	3.36	3.62
March	11,900	215	997	4.94	5.70
April	1,820	169	472	2.34	2.61
May	862	98	275	1.36	1.57
June	2,930	142	580	2.87	3.20
July	150	21	50.7	.251	.29
August	1,010	4.8	91.3	.452	.52
September	68	4.0	20.2	.100	.11
The year	11,900	4.0	482	2.39	32.48

LITTLE BEAVER CREEK BASIN.

LITTLE BEAVER CREEK NEAR EAST LIVERPOOL, OHIO.

LOCATION.—At steel highway bridge known as Grimms Bridge, about 4 miles above mouth of river and about 4 miles northeast of East Liverpool, Columbiana County. The North Fork enters river on left about 3 miles above station.

DRAINAGE AREA.—505 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 17, 1915, to September 30, 1916.

GAGE.—Chain gage fastened to downstream side of highway bridge; read by C. W. Garn.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Stay wire used for measurements at high stages.

CHANNEL AND CONTROL.—One channel at all stages, at extreme high stages water flows around both bridge abutments. Channel straight for 100 feet above and 300 feet below station. Rapids about 600 feet below bridge act as primary control, probably permanent. Point of zero flow, gage height, 0.1 ± 0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.07 feet at 7.30 a. m. June 2; minimum, 1.98 feet at 7 a. m. September 26.

Highest known flood reached a stage represented by gage height about 20 feet.

ICE.—Stage-discharge relation affected by ice and by ice jams.

ACCURACY.—Stage-discharge relation probably permanent; affected by ice in December, January, February, and March; see footnote to table of daily gage heights. Data inadequate for determining rating curve. Gage read twice daily to hundredths.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

The following discharge measurement was made by wading by Lasley Lee:

September 27: Gage height, 2.06 feet; discharge, 25.1 second-feet.

Daily gage height, in feet, of Little Beaver Creek near East Liverpool, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.90	2.46	3.02	6.32	6.05	5.20	4.80	4.98	2.98	3.30	2.71	2.29
2	4.14	2.50	3.06	9.74	5.33	.....	4.78	4.62	2.91	3.12	2.47	2.28
3	3.72	2.42	2.95	7.39	4.81	4.04	4.50	4.56	8.10	4.34	2.39	2.22
4	3.40	2.42	3.08	5.75	4.04	.....	4.54	5.66	6.15	3.70	2.32	2.16
5	3.32	2.42	3.09	5.52	4.25	3.86	4.34	4.91	4.72	3.32	2.33	2.13
6	3.32	2.42	2.92	5.98	4.06	.....	4.12	4.46	4.00	3.09	2.42	2.20
7	3.12	2.48	2.82	4.96	3.95	8.02	3.95	4.58	4.18	2.94	2.35	2.28
8	2.98	2.73	2.86	4.04	4.40	8.76	3.96	4.46	4.58	2.88	2.58	2.38
9	2.88	2.63	2.86	4.00	4.70	6.54	4.18	4.10	4.12	2.82	2.96	2.44
10	2.82	2.54	2.84	4.32	4.45	5.37	5.25	3.84	3.92	2.87	2.74	2.34
11	2.76	2.50	2.85	5.02	4.22	4.60	5.36	3.78	3.98	2.84	2.56	2.22
12	2.74	2.57	2.85	5.26	4.48	4.64	4.88	3.64	3.73	2.80	2.46	2.18
13	2.70	2.82	2.84	8.93	4.98	4.60	4.51	3.51	3.48	2.70	2.34	2.10
14	2.68	2.78	2.80	6.98	5.12	5.40	5.24	3.43	3.33	3.21	2.24	2.09
15	2.66	2.74	2.79	5.15	.....	4.49	5.54	4.06	3.28	2.86	2.18	2.16
16	2.70	3.06	2.82	4.90	4.50	5.05	4.78	3.64	3.29	3.75	2.22	2.24
17	2.70	2.95	3.28	4.84	.....	4.48	5.02	3.66	3.21	4.05	2.23	2.26
18	2.68	2.82	6.54	5.65	4.88	4.49	4.88	3.56	3.25	3.47	2.23	2.20
19	2.70	3.35	5.66	.....	.....	4.29	4.36	3.42	3.70	3.19	2.19	2.13
20	2.72	3.81	4.69	5.52	4.80	4.60	4.20	3.30	4.40	2.99	2.18	2.12
21	2.75	3.64	4.39	.....	.....	4.13	4.39	3.22	4.29	3.08	2.26	2.08
22	2.70	3.44	4.28	5.84	4.66	7.36	7.08	3.24	4.75	2.84	2.32	2.09
23	2.62	3.23	4.01	5.14	.....	7.96	6.56	3.91	4.07	2.72	2.88	2.09
24	2.60	3.14	4.52	4.48	4.98	7.46	5.90	3.86	3.74	2.63	2.43	2.08
25	2.54	3.08	4.60	4.28	.....	7.94	5.38	3.55	5.88	2.60	2.39	2.06
26	2.55	3.03	5.70	4.32	6.20	8.87	5.04	3.36	4.60	2.54	2.35	2.02
27	2.54	3.06	4.94	4.44	.....	7.83	6.10	3.21	3.91	2.48	2.71	2.04
28	2.54	3.20	5.56	4.42	5.46	7.10	7.12	3.23	3.60	2.42	2.64	2.02
29	2.54	3.28	6.58	4.20	.....	6.24	6.35	3.24	3.44	2.36	2.58	2.12
30	2.52	3.22	7.92	4.96	.....	5.62	5.52	3.23	3.32	2.33	2.48	2.18
31	2.50	.....	6.58	5.62	.....	5.08	.....	3.14	.....	2.33	2.27	.....

NOTE.—Gage read to top of ice Dec. 16–17, Jan. 18–20, and Feb. 14 to Mar. 6. River reported frozen Dec 4; ice jam reported below gage Mar. 16.

YELLOW CREEK BASIN.

YELLOW CREEK AT HAMMONDSVILLE, OHIO.

LOCATION.—At covered highway bridge on Steubenville Pike, about one-fifth mile southwest of Hammondsville, Jefferson County. The North Fork enters on the left 1,000 feet below the station.

DRAINAGE AREA.—169 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 13, 1915, to September 30, 1916.

GAGE.—Chain gage on downstream side of bridge about 25 feet from left end; read by W. J. Sprague.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—One channel; straight 1,000 feet above and curved 100 feet below station; at extreme high stages stream flows around both abutments of bridge. Control practically permanent. Point of zero flow, gage height 1.4 feet ± 0.1 foot September, 1915, and September, 1916.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.75 feet at 4.45 p. m. December 29; minimum stage, 1.69 feet at 4 p. m. August 29.

Highest known flood reached a stage represented by gage height about 16 feet.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation practically permanent, affected by ice during January; see footnote to table of daily gage heights. Data inadequate for determining rating curve. Gage read twice daily to hundredths.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

The following discharge measurement was made by wading by Lasley Lee:

September 27: Gage height, 1.88 feet; discharge, 3.3 second-feet.

Daily gage height, in feet, of Yellow Creek at Hammondsville, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.73	2.12	2.58	4.73	5.32	3.16	3.76	4.04	2.95	2.69	2.73	1.94
2	3.09	2.11	2.58	6.14	4.76	3.68	3.78	3.82	2.76	2.63	2.46	1.93
3	2.74	2.10	2.54	5.86	4.23	3.85	3.92	3.76	6.81	3.12	2.29	1.92
4	2.56	2.09	2.52	5.22	3.52	3.74	3.76	4.08	4.78	2.78	2.24	1.91
5	2.70	2.09	2.51	4.87	3.13	3.55	3.52	3.74	3.76	2.65	2.15	1.90
6	2.60	2.08	2.48	4.20	3.24	3.29	3.37	3.75	3.46	2.54	2.15	1.88
7	2.48	2.22	2.46	3.84	3.46	5.38	3.26	3.93	3.37	2.46	2.10	1.87
8	2.37	2.23	2.48	3.50	3.16	5.32	3.72	3.66	3.35	2.46	2.08	2.12
9	2.36	2.24	2.47	3.35	3.42	4.50	4.20	3.55	3.26	2.44	2.06	2.10
10	2.30	2.22	2.42	3.26	3.26	4.28	4.03	3.46	3.68	2.42	2.02	2.06
11	2.28	2.19	2.41	4.13	3.16	4.18	3.86	3.28	4.63	2.37	2.06	2.00
12	2.26	2.44	2.40	4.22	3.16	4.05	3.76	3.09	3.87	2.30	2.04	1.92
13	2.23	2.71	2.46	7.44	3.94	3.90	3.65	2.94	3.62	2.64	2.00	1.87
14	2.19	2.86	2.38	5.00	3.70	3.72	4.44	3.24	3.35	2.49	2.00	1.85
15	2.34	2.87	2.24	4.72	3.66	3.72	4.24	4.48	3.70	2.30	1.96	1.93
16	2.42	2.76	2.46	3.52	3.39	3.28	4.03	3.84	3.13	2.92	1.96	1.98
17	2.29	2.66	2.56	3.35	3.51	3.12	4.01	3.68	2.89	2.96	1.95	1.97
18	2.24	2.62	2.50	3.56	3.53	3.02	3.84	3.40	2.84	2.88	1.95	1.94
19	2.24	2.85	2.97	4.29	3.50	2.93	3.59	3.21	2.93	2.63	1.94	1.92
20	2.26	3.87	3.36	4.98	3.48	3.17	3.52	3.10	3.24	2.51	1.94	1.90
21	2.24	3.40	3.31	5.88	3.46	3.31	3.74	3.00	3.40	2.38	1.94	1.89
22	2.22	2.97	3.29	4.75	3.41	8.20	4.54	3.04	3.76	2.33	1.93	1.90
23	2.20	2.79	3.34	3.43	3.68	5.72	4.36	3.15	3.33	2.30	1.92	1.90
24	2.18	2.73	3.32	3.36	3.78	5.16	4.14	3.08	3.03	2.23	1.92	1.90
25	2.16	2.70	3.26	3.34	4.98	5.07	4.14	3.26	3.76	2.21	1.87	1.88
26	2.16	2.66	3.47	3.34	4.77	4.92	4.17	3.16	3.28	2.28	1.79	1.88
27	2.14	2.62	3.73	3.32	4.38	4.78	4.46	3.16	3.04	2.17	1.76	1.87
28	2.12	2.56	4.13	3.29	3.98	4.58	5.06	3.12	2.93	2.14	1.73	1.85
29	2.18	2.92	8.52	3.23	3.36	4.34	4.58	3.22	2.82	2.08	1.70	1.91
30	2.16	2.80	6.26	6.00	.....	4.08	4.30	3.29	2.74	2.07	2.09	2.08
31	2.15	.....	4.60	5.05	.....	3.88	.....	3.10	.....	2.04	2.05	.....

NOTE.—Stream reported choked with slush ice Jan. 19–20.

MIDDLE ISLAND CREEK BASIN.

MIDDLE ISLAND CREEK AT LITTLE, W. VA.

LOCATION.—At highway bridge at Little, about 6 miles southeast of Friendly, Tyler County. Stewart Run enters on left about 500 feet below station.

DRAINAGE AREA.—458 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 7, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff on left bank immediately below the bridge; read by J. R. Bowles.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Stay wire is used for measurements at high stages.

CHANNEL AND CONTROL.—One channel at all stages; straight for about 400 feet above and 250 feet below station. Primary control is at foundation of old mill dam, 250 feet below station; composed of bed rock, foundation timbers, small deposit of rock and sand, probably permanent. Point of zero flow, gage height, 1.4 feet ±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.33 feet at 8 a. m. December 18; discharge, 12,900 second-feet; minimum mean daily stage, 2.07 feet July 13 and August 7; discharge, 11 second-feet.

Highest flood known occurred in August, 1875; gage height about 33.5 feet.

ICE.—Affected by ice except in mild winters.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice in January. Rating curve well defined between 32 and 11,000 second-feet; beyond these limits the curve is an extension. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. Discharge interpolated account of ice January 17–19 and January 21. Results excellent.

COOPERATION.—Base data furnished by United States Engineer Corps.

The following discharge measurements were made by A. E. Frosch, of the United States Engineer Corps:

February 25, 1916: Gage height, 13.58 feet; discharge, 9,810 second-feet.

February 26, 1916: Gage height, 7.55 feet; discharge, 3,670 second-feet.

Daily discharge, in second-feet, of Middle Island Creek at Little, W. Va., for the years ending Sept. 30, 1915 and 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1915.						1915.					
1	.....	755	18	72	285	16	19	470	28	18	46
2	.....	380	285	79	181	17	18	308	43	22	32
3	.....	1,180	470	50	114	18	16	221	155	69	26
4	.....	2,030	755	64	146	19	13	162	149	32	1,870
5	.....	722	560	50	1,320	20	12	100	95	30	1,400
6	.....	380	285	31	1,100	21	12	69	55	21	558
7	48	264	126	27	820	22	39	46	46	22	285
8	48	204	95	87	690	23	2,590	32	41	50	264
9	43	155	308	1,100	440	24	820	25	31	69	162
10	39	126	200	625	330	25	308	19	20	114	117
11	34	92	112	200	208	26	200	15	15	64	97
12	30	185	79	84	149	27	162	12	11	41	79
13	25	185	50	74	123	28	159	10	16	79	67
14	22	192	43	36	87	29	159	10	11	181	46
15	20	181	32	22	60	30	2,760	14	11	285	41
						31	1,710	.....	14	500	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	3,270	69	189	6,820	6,400	788	960	380	560	31	15	72
2	6,500	55	185	7,660	2,670	788	592	330	440	355	13	48
3	1,400	46	192	3,270	1,320	1,480	470	308	755	264	12	39
4	625	41	264	1,030	960	960	440	960	380	177	28	25
5	410	36	264	722	890	722	410	1,100	200	112	21	25
6	380	32	234	1,400	960	558	355	690	285	60	15	15
7	285	30	200	1,630	3,630	2,920	308	4,580	1,320	60	11	25
8	217	28	173	890	1,550	3,010	308	3,900	1,100	25	97	196
9	149	28	162	560	960	1,710	960	1,030	560	15	90	788
10	129	27	155	560	960	820	960	690	625	14	103	308
11	92	27	136	2,430	820	625	722	530	2,760	13	1,710	84
12	84	28	132	7,550	2,430	500	560	380	1,180	12	2,840	177
13	74	30	129	4,980	9,500	470	440	264	355	11	2,350	97
14	67	57	285	2,590	2,840	890	380	204	264	21	1,030	97
15	55	4,000	560	960	1,250	5,480	355	155	1,630	17	440	755
16	46	3,360	722	755	890	2,430	308	129	5,180	39	238	1,180
17	41	820	6,710	655	1,100	1,480	330	285	1,320	92	149	97
18	36	440	12,500	555	1,320	1,030	330	440	592	149	106	196
19	1,480	820	5,880	455	1,100	755	285	264	560	225	77	142
20	1,870	2,590	1,250	355	820	560	221	103	890	229	55	60
21	625	1,250	722	1,270	755	722	229	52	2,760	170	27	39
22	355	558	500	2,190	625	5,880	380	30	2,590	1,710	25	37
23	264	410	410	2,760	530	4,180	440	43	1,100	530	22	36
24	177	308	380	1,250	500	1,250	380	62	530	308	20	25
25	129	242	330	755	10,700	820	355	82	722	136	18	22
26	90	149	1,180	560	4,000	560	330	62	355	95	27	20
27	112	149	960	440	2,760	820	690	103	142	69	173	19
28	149	234	1,790	380	1,870	6,080	960	221	92	43	242	18
29	123	229	6,710	530	1,100	4,780	722	1,550	72	31	181	27
30	95	225	9,060	7,340	.....	3,810	530	1,550	43	22	97	50
31	79	.....	6,600	2,840	.....	2,190	.....	1,180	.....	18	84	.....

NOTE.—Jan. 17-19 and 21, 1916, discharge interpolated on account of ice.

Monthly discharge of Middle Island Creek at Little, W. Va., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 458 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
May 7-31	2,760	12	372	0.812	0.75
June	2,030	10	285	.622	.69
July	755	11	134	.293	.34
August	1,100	18	135	.295	.34
September	1,870	26	371	.810	.90
1915-16.					
October	6,500	36	626	1.37	1.58
November	4,000	27	544	1.19	1.33
December	12,500	129	1,900	4.15	4.78
January	7,660	355	2,130	4.65	5.36
February	10,700	500	2,250	4.91	5.30
March	6,080	470	1,910	4.17	4.81
April	960	221	490	1.07	1.19
May	4,580	30	699	1.53	1.76
June	5,180	43	979	2.14	2.39
July	1,710	11	163	.356	.41
August	2,840	11	333	.727	.84
September	1,180	15	157	.343	.38
The year	12,500	11	1,010	2.21	30.13

LITTLE MUSKINGUM RIVER BASIN.

LITTLE MUSKINGUM RIVER AT FAY, OHIO.

LOCATION.—About 1 mile northwest of Fay, Washington County, Ohio, 7 miles from St. Marys, W. Va., and 12 miles from Marietta, Ohio. Bear Run enters on left about half a mile above station. Covered highway bridge crosses river just above Bear Run.

DRAINAGE AREA.—259 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 14, 1915, to September 30, 1916.

GAGE.—Inclined and vertical staff on right bank about 400 feet below suspension footbridge; read by G. I. Smith.

DISCHARGE MEASUREMENTS.—Made from suspension bridge or by wading. Stay wire used for measurements at high stages.

CHANNEL AND CONTROL.—One channel at all stages; straight several hundred feet above and below bridge. Overflow at gage height about 13 feet; wide overflow at maximum stages. Bed of stream mud, sand, rock, and gravel; primary control at ford 50 feet below gage compact sand and gravel; fairly permanent. Point of zero flow, gage height 0.7 ± 0.2 foot May, 1915.

EXTREMES OF STAGE.—Maximum stage recorded during the year, 19 feet at 8 a. m., December 18; minimum, 1.18 feet at 6 p. m., August 5.

Highest flood known reached a stage represented by gage height about 23 feet.

ICE.—Stage-discharge relation affected by ice in severe winters.

ACCURACY.—Stage-discharge relation probably permanent; not materiall yaffected by ice this winter. Creek partly frozen February 19. Data inadequate for determining rating curve. Gage read twice daily to hundredths.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Little Muskingum River at Fay, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by [a]—	Gage height.	Discharge.	Date.	Made by [a]—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	A. E. Frosch	3.99	667	Mar. 29	A. E. Frosch	6.48	1,540
30	do	10.11	2,970	May 22	Leasure and Frosch	1.77	48

[a] U. S. Engineer Corps.

Daily gage height, in feet, of Little Muskingum River at Fay, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	10.58	1.59	2.09	6.08	10.10	3.02	3.23	2.49	2.46	1.70	1.32	1.88
2	8.55	1.56	2.02	12.98	5.00	3.06	3.12	2.40	2.22	1.67	1.23	1.69
3	4.58	1.56	2.10	4.90	3.69	3.05	3.01	2.46	4.85	1.64	1.20	1.52
4	4.06	1.52	2.09	3.79	3.38	2.82	2.95	4.20	3.63	1.61	1.40	1.50
5	5.05	1.50	2.04	3.36	3.42	2.81	2.81	3.42	2.66	1.59	1.24	1.48
6	4.62	1.52	2.00	4.72	3.72	2.91	2.67	2.96	2.91	1.52	2.03	1.51
7	3.30	1.52	1.95	3.85	5.32	6.15	2.58	11.60	3.64	1.57	1.87	1.57
8	3.10	1.50	1.98	3.35	3.62	4.67	2.75	7.10	3.63	1.46	1.87	2.12
9	3.88	1.56	1.92	2.88	3.50	3.52	4.19	4.89	2.98	1.42	1.76	1.33
10	2.95	1.56	1.90	3.02	3.26	3.18	3.61	3.14	2.89	1.40	1.74	1.56
11	2.08	1.52	1.89	5.25	3.18	2.94	3.21	2.82	3.75	1.37	6.13	1.44
12	2.18	1.58	1.89	10.15	7.12	2.84	3.04	2.56	2.84	1.36	9.63	1.41
13	2.22	1.69	1.90	10.60	11.55	2.76	3.27	2.37	2.47	1.42	3.75	1.39
14	2.25	2.15	2.08	4.60	4.65	3.52	2.66	2.27	2.19	1.35	3.49	1.41
15	2.08	9.15	2.04	3.38	3.32	6.26	2.59	2.18	3.50	1.27	2.66	2.48
16	1.74	4.82	1.99	3.28	3.32	4.32	2.42	2.10	4.79	1.90	2.32	1.60
17	1.72	3.20	12.75	2.65	3.89	3.84	2.39	2.03	3.10	2.11	2.12	1.55
18	1.78	2.50	18.00	2.70	5.79	3.48	2.32	2.01	2.59	1.87	1.98	1.56
19	3.45	6.58	7.60	2.69	4.75	3.19	2.23	1.95	2.47	1.67	1.80	1.53
20	3.08	5.92	4.22	2.90	4.35	3.02	2.17	1.86	2.44	1.57	1.70	1.51
21	2.38	4.05	3.34	3.51	4.19	3.38	2.61	1.80	7.10	1.55	1.63	1.49
22	2.18	3.20	3.10	5.00	3.65	12.30	4.53	1.74	4.41	1.47	1.57	1.39
23	2.08	2.75	2.88	5.48	3.48	8.70	3.44	1.78	2.99	1.45	1.49	1.30
24	1.92	2.54	2.82	3.76	3.80	3.93	3.07	1.81	2.59	1.47	1.42	1.26
25	1.85	2.39	2.90	3.25	8.40	3.52	2.85	1.77	2.35	1.43	1.47	1.23
26	1.82	2.19	5.64	3.02	5.35	3.19	2.79	1.76	2.19	1.40	1.63	1.22
27	1.78	2.19	4.40	2.82	3.95	7.30	3.14	1.75	2.04	1.33	5.08	1.20
28	1.72	2.18	6.18	2.74	3.26	15.30	2.97	1.89	1.90	1.31	3.38	1.25
29	1.70	2.18	12.88	3.38	3.28	6.70	2.80	2.98	1.83	1.26	2.86	1.50
30	1.65	2.16	13.54	9.20	.....	4.22	2.65	5.34	1.76	1.24	2.36	1.43
31	1.59	.....	4.45	6.68	.....	3.52	.....	3.44	.....	1.24	2.11	.....

MUSKINGUM RIVER BASIN.

MUSKINGUM RIVER AT FRAZIER, OHIO.

LOCATION.—At highway bridge at Frazier, Muskingum County, 4½ miles below Zanesville. Brush Creek enters on right bank about one-third mile below the gage.

DRAINAGE AREA.—6,980 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—June 1, 1915, to September 30, 1916.

GAGE.—Staff graduated to half-tenths near upper corner of right abutment of bridge, read by D. A. Burns. Sea-level elevation of zero of gage, 663.29 feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading on crest of dam No. 9 about 5½ miles below gage. Leakage past dam, through lock and power plants, should be included with flow over crest.

CHANNEL AND CONTROL.—River straight above and below. Control is crest of dam No. 9 about 5½ miles below gage. Except for leakage through lock and leakage and flow through power plants at the dam the gage height of the crest of the dam, 9.0 feet, is the point at which flow would be zero.

EXTREMES OF STAGE.—Maximum stage recorded during year, 23.0 feet at 6 p. m. March 28; minimum stage, 9.5 feet September 7–14.

Flood of March, 1913, reached a stage of 49.1 feet, highest stage ever recorded.

ICE.—Stage-discharge relation affected by ice jams at times.

DIVERSIONS.—None. (See "Regulation" and "Accuracy.")

REGULATION.—Leakage through the lock and the power plants at dam 9 and the operation of power plants at dams 9 and 10 may affect the low-water flow to some extent

ACCURACY.—Stage-discharge relation permanent, except as affected by leakage through dam 9, through the gates of the power plants and through the lock, and by operation of the power plants at dam 9; probably not affected by ice this year. The flow from the area between the measuring section and the crest of dam 9 may be sufficient at times to affect the stage-discharge relation. This area, however, is small and such conditions would be of rare occurrence. Rating curve well defined to 64,000 second-feet. Gage read twice daily to tenths. Daily discharge ascertained by applying the mean daily gage heights to the rating table. Results good.

COOPERATION.—Base data furnished by the United States Engineer Corps.

Daily and monthly discharge withheld for additional information.

Discharge measurements of Muskingum River at Frazier, Ohio, during the years ending Sept. 30, 1915, and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1915–16.		*Feet.*	*Sec.-ft.*
June 17	Frye and Dial	13.05	16,400	Jan. 4	W. H. Dial	20.25	50,700
July 14	Moeser and Dial	11.3	7,940	6	do	17.6	40,500
19	Frye and Dial	13.65	18,700	7	do	15.85	31,700
1915–16.				8	do	14.0	22,000
Jan. 3	W. H. Dial	21.35	56,400				

Daily gage height, in feet, of Muskingum River at Frazier, Ohio, for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					1915.				
1	11.20	11.40	11.55	10.00	16	14.50	14.25	11.60	10.10
2	11.20	13.10	11.70	9.90	17	13.15	18.25	10.70	10.15
3	11.40	15.60	12.25	9.80	18	12.20	15.85	10.35	10.10
4	10.90	14.90	13.50	9.95	19	11.35	13.70	10.20	11.40
5	10.60	16.35	12.80	10.90	20	10.70	12.45	10.05	11.05
6	10.50	16.10	12.20	15.35	21	10.40	11.45	10.25	11.20
7	10.10	14.20	11.35	15.20	22	10.15	11.10	10.50	10.95
8	10.10	13.35	11.00	14.00	23	10.05	10.75	10.45	10.60
9	10.10	12.70	11.00	12.75	24	9.85	10.55	10.45	10.25
10	10.20	12.40	11.10	12.40	25	9.80	10.40	10.45	10.05
11	10.00	11.85	11.10	11.90	26	9.75	10.40	10.35	9.95
12	10.00	11.85	12.00	11.60	27	9.70	10.50	10.15	10.10
13	9.85	11.65	12.05	11.10	28	9.70	10.65	10.05	10.30
14	9.80	11.35	11.60	10.70	29	9.60	10.60	9.95	10.45
15	11.50	10.85	11.05	10.45	30	10.40	10.55	10.10	10.25
					31	.....	10.80	10.10	.....

Daily gage height, in feet, of Muskingum River at Frazier, Ohio, for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	10.55	9.60	10.90	17.55	17.35	11.25	15.70	11.70	11.15	10.60	9.70	9.60
2	10.75	9.60	10.70	21.10	16.25	10.95	14.55	11.35	10.85	10.50	9.70	9.60
3	11.10	9.60	10.50	21.30	15.00	10.85	13.30	11.10	12.20	10.35	9.70	9.60
4	11.10	9.55	10.40	20.85	13.90	10.65	12.55	11.35	12.40	10.25	9.65	9.60
5	10.85	9.50	10.30	19.40	12.85	10.60	12.10	11.45	12.80	10.55	9.60	9.60
6	10.65	9.60	10.10	17.50	12.20	10.60	11.80	11.55	12.40	10.45	9.60	9.60
7	10.45	9.60	10.10	15.90	11.75	11.80	11.60	12.70	11.85	10.35	9.60	9.50
8	10.30	9.60	10.00	16.00	11.35	14.45	11.55	13.75	11.95	10.30	9.60	9.50
9	10.10	9.60	10.00	12.60	11.35	14.85	11.70	13.30	12.60	10.20	9.70	9.50
10	9.95	9.60	10.00	12.10	10.95	14.90	11.55	12.60	12.15	10.50	9.60	9.50
11	9.90	9.55	10.00	12.45	10.85	13.35	12.35	12.00	12.50	10.00	9.60	9.50
12	9.90	9.50	10.00	14.40	10.55	11.40	12.45	11.40	12.45	9.95	9.70	9.50
13	9.80	9.60	10.00	18.70	11.85	11.75	12.05	11.10	11.95	9.85	9.70	9.50
14	9.80	9.60	9.95	19.45	11.50	11.65	11.75	10.95	11.45	9.80	9.75	9.50
15	9.80	9.70	9.90	17.50	11.10	11.50	11.95	11.05	10.95	9.80	9.85	9.60
16	9.80	9.80	9.85	16.25	11.85	11.40	11.65	10.90	10.85	9.85	9.90	9.60
17	9.85	9.80	10.80	14.35	11.05	11.45	11.60	10.95	10.65	10.00	9.80	9.60
18	9.90	10.00	13.50	12.55	11.35	11.35	11.70	10.75	11.40	10.20	9.70	9.60
19	9.90	10.90	14.05	12.60	11.35	11.30	11.80	10.65	11.35	10.10	9.70	9.60
20	10.15	11.60	13.90	14.35	11.45	11.15	11.40	10.50	11.40	10.15	9.60	9.60
21	10.20	12.00	13.20	14.00	11.45	11.35	11.45	10.35	11.65	10.35	9.60	9.60
22	10.15	11.85	12.80	12.60	11.35	15.25	11.25	10.25	12.15	10.25	9.60	9.60
23	10.00	11.40	12.40	13.80	11.35	20.45	11.45	10.25	12.35	10.05	9.50	9.60
24	9.90	10.90	11.85	13.45	11.65	18.60	11.35	10.80	11.95	9.90	9.60	9.60
25	9.80	10.50	11.70	12.85	12.00	18.35	11.05	10.85	11.55	9.80	9.50	9.60
26	9.80	10.35	12.60	12.25	11.75	18.15	11.45	10.85	11.50	9.80	9.50	9.60
27	9.80	10.40	13.05	11.95	11.65	18.60	10.85	10.85	11.15	9.80	9.55	9.60
28	9.70	10.60	13.30	11.85	11.45	22.35	12.35	11.05	10.95	9.70	9.60	9.60
29	9.70	10.85	15.30	12.00	11.55	21.85	12.70	11.35	10.85	9.70	9.70	9.60
30	9.65	10.85	18.50	14.10	.....	20.40	12.25	11.35	10.65	9.70	9.70	9.60
31	9.60	.....	17.20	16.80	.....	17.25	.....	11.30	.....	9.60	9.70	.....

MUSKINGUM RIVER AT BEVERLY, OHIO.

LOCATION.—At Lock 4 at Beverly, Washington County. Wolf Creek enters on right immediately above the station.

DRAINAGE AREA.—7,700 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—June 1, 1915, to September 30, 1916.

GAGE.—Ceramic tile gage graduated to tenths of a foot, on lower buttress of river wall of Lock 4 about 1,000 feet above the measuring section. Sea-level elevation of zero of gage, 602.60 feet (United States Engineer Corps).

DISCHARGE MEASUREMENTS.—Made from upstream side of highway bridge 1,000 feet below gage.

CHANNEL AND CONTROL.—Bed of stream gravel and masonry débris of old bridge piers, probably permanent. Stream curves slightly to the left from 1,000 feet above to 1,000 feet below the section. Control is crest of Dam 3, 10.8 miles below. At gage height 5.2 feet or crest of dam 3, flow would be zero, provided there was no leakage through dam, lock or power plant at dam.

EXTREMES OF STAGE.—Maximum stage recorded during year, 23.9 feet at 6 p. m. March 28; minimum stage, 2.9 feet September 28.

Flood of March, 1913, reached a stage of 46.55 feet, the highest stage ever recorded.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None. (See "Accuracy" and "Regulation.")

REGULATION.—Leakage through Dam 3, lock, and the power plant at the dam may affect the low-water flow to some extent.

ACCURACY.—Stage-discharge relation practically permanent, not affected by ice. Dam 3, about 11 miles below, the control for the gage, leaks so that the water falls below the crest during low water. Change in this leakage, leakage and flow through the power plant, leakage through lock and inflow into pool 3 below the measuring section may all affect the stage-discharge relation at low and medium stages. When the stage of the Ohio at Marietta is about 39 feet or more the stage-discharge relation is affected by backwater. Rating curve is well defined between 10,000 and 85,000 second-feet; beyond these limits the curve is an extension. Gage read twice daily to tenths.

COOPERATION.—Base data furnished by United States Engineer Corps.

Records of daily and monthly discharge withheld for additional information.

Discharge measurements of Muskingum River at Beverly, Ohio, during the year ending Sept. 30, 1916.

[Made by Wm. H. Dial.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 24	19.75	48,500	Mar. 28	24.77	77,000	Apr. 3	12.35	21,100
Mar. 25	18.37	44,800	Mar. 30	21.70	59,200	Apr. 4	11.05	16,300
Mar. 27	18.95	47,400	Apr. 1	16.00	34,500	Apr. 5	10.40	14,700
Mar. 28	24.05	72,800	Apr. 2	13.95	26,900			

Daily gage height, in feet, of Muskingum River at Beverly, Ohio, for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					1915.				
1	8.40	8.10	8.45	6.60	16	13.70	12.30	7.70	7.05
2	8.25	11.30	9.10	6.35	17	11.65	18.05	7.60	6.80
3	8.75	14.15	9.20	6.20	18	10.35	17.35	7.35	6.80
4	8.30	14 45	11.65	7.55	19	8.90	13.00	6.90	11.15
5	7.55	14.55	11.25	8.95	20	7.80	10.95	6.70	8.25
6	7.05	15.60	10.00	14.70	21	7.15	9.30	6.65	8.55
7	6.65	13.30	8.95	15.30	22	6.90	8.55	7.05	8.25
8	6.45	12.50	8.25	13.35	23	6.55	7.80	7.30	7.75
9	6.35	11.25	8.30	11.50	24	6.35	7.55	7.30	7.25
10	6.20	10.40	8.00	11.05	25	6.15	7.25	7.65	6.85
11	6.20	10.15	8.15	9.95	26	6.00	7.05	6.95	6.45
12	6.20	10.25	10.20	9.20	27	6.00	7.00	6.80	6.40
13	6.20	9.55	10.20	8.70	28	5.90	7.05	6.70	6.90
14	6.10	9.00	9.25	7.80	29	5.80	7.45	6.60	7.00
15	8.65	8.35	8.55	7.35	30	8.10	7.20	6.70	7.00
					31	.....	7.10	6.70	.....

Daily gage height, in feet, of Muskingum River at Beverly, Ohio, for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	9.60	5.90	7.95	17.55	18.60	8.80	15.65	9.25	8.00	6.75	5.30	4.50
2	8.30	5.80	7.65	21.60	16.80	8.45	14.00	8.65	7.60	6.60	5.20	4.50
3	8.00	5.80	7.50	22.55	14.60	8.15	12.50	8.15	10.60	6.50	5.10	4.40
4	8.50	5.80	7.25	21.55	13.25	7.80	11.20	8.40	10.90	6.40	5.00	4.35
5	8.15	5.70	7.10	20.35	12.00	7.55	10.45	8.50	10.95	6.80	5.10	4.20
6	7.75	5.70	6.95	19.05	10.55	7.40	9.85	8.85	10.65	6.65	5.20	3.85
7	7.40	5.70	6.80	16.15	10.10	9.95	9.45	11.80	9.90	6.45	4.95	3.75
8	7.10	5.70	6.75	14.05	9.05	12.80	9.10	12.60	9.70	6.30	4.80	3.60
9	6.80	5.70	6.60	11.30	8.65	14.40	9.80	12.00	10.70	6.30	4.70	3.60
10	6.60	5.70	6.60	10.25	8.50	14.35	9.65	11.15	10.45	6.15	4.60	3.60
11	6.50	5.70	6.60	10.95	8.40	12.70	10.20	10.00	10.70	6.10	4.50	3.90
12	6.40	5.80	6.50	14.60	10.25	10.90	10.20	8.65	10.80	6.00	5.55	3.85
13	6.35	5.70	6.50	19.40	11.25	9.80	10.10	8.05	9.60	6.00	5.65	3.80
14	6.20	6.05	6.50	20.45	9.85	9.50	9.50	7.75	8.80	5.95	5.45	3.70
15	6.20	6.95	6.50	18.45	9.35	10.20	9.00	8.55	8.10	5.85	5.40	4.70
16	6.20	6.25	6.30	16.35	8.85	9.45	9.25	7.70	7.75	5.80	5.40	4.30
17	6.20	6.10	11.65	14.90	8.90	9.00	9.20	8.10	7.45	5.90	5.35	3.85
18	6.20	6.20	15.90	11.90	9.45	8.80	8.90	7.85	8.10	6.20	5.30	3.65
19	6.20	9.15	14.10	9.40	9.40	8.65	9.30	7.60	8.20	6.20	5.00	3.60
20	6.45	9.80	13.10	9.05	9.20	8.40	8.75	7.35	8.20	6.30	4.65	3.60
21	6.60	9.85	11.80	9.66	9.85	8.30	8.30	7.00	10.20	6.30	4.50	3.60
22	6.60	9.55	11.05	11.25	9.30	14.45	8.40	6.90	10.25	6.30	4.35	3.60
23	6.50	8.80	10.40	12.60	9.10	20.10	8.60	6.90	10.10	6.00	4.30	3.50
24	6.30	8.00	9.90	12.35	9.20	19.60	8.50	7.45	9.95	5.85	4.30	3.35
25	6.20	7.40	9.50	11.65	11.65	18.30	8.45	7.55	8.95	5.80	4.20	3.15
26	6.10	7.05	11.00	10.60	11.20	18.25	8.20	7.60	8.50	5.65	4.10	3.00
27	6.10	6.95	11.35	9.80	10.75	18.75	8.10	7.50	8.45	5.60	4.00	3.00
28	6.00	7.50	12.20	9.60	10.20	23.90	9.05	7.65	7.75	5.50	4.10	2.90
29	6.00	7.65	17.30	10.15	9.65	23.75	10.35	8.20	7.15	5.50	4.55	2.95
30	5.90	8.15	19.60	14.15	.....	21.25	10.10	9.20	6.95	5.40	4.60	3.00
31	5.90	.....	17.55	16.50	.....	18.25	.....	8.55	.....	5.40	4.60	.....

LITTLE KANAWHA RIVER BASIN.

LITTLE KANAWHA RIVER AT GLENVILLE, W. VA.

LOCATION.—At three-span steel highway bridge at Glenville, Gilmer County. Stewart Creek enters on right about 1½ miles above the station.

DRAINAGE AREA.—385 square miles (measured on topographic maps.)

RECORDS AVAILABLE.—June 1, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff attached to upstream side of right pier of bridge; read by Hollie Gainor. Gage was established by the United States Weather Bureau September 10, 1900 (read daily to tenths at 8 a. m.); repaired and its datum lowered 2.5 feet on June 1, 1915.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Stay wire is used for measurements at high stages.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and 150 feet below station. Bed of river composed of mud, rock, sand, and gravel; control is probably fairly permanent. Point of zero flow, gage height 1.0±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 22.5 feet at 8.25 a. m. February 13; mimimum stage, 1.60 feet morning and afternoon, August 5.

Maximum stage recorded since September, 1900, 21.2 old datum, 23.7 present datum, on January 9, 1907.

Highest flood known reached a stage represented by gage height about 29 feet, referred to present datum.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice this year. Data inadequate for determining rating curve. Gage read twice daily to hundreths. Gage heights September 1 to November 22 are United States Weather Bureau readings taken once a day to the nearest tenth and may be in error at low stages. Other records excellent.

COOPERATION.—Base data furnished by United States Engineer Corps.

The following discharge measurement was made by G. M. Dexter, United States Engineer Corps:

August 27, 1916: Gage height, 1.93 feet; discharge, 27 second-feet.

Daily gage height, in feet, of Little Kanawha River at Glenville, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	19.0	2.5	3.05	5.60	13.85	4.42	4.60	4.12.	2.78	2.63	1.78	2.08
2	15.0	2.5	3.05	12.00	7.95	6.85	4.27	3.92	2.65	2.53	1.70	2.25
3	5.0	2.5	3.28	6.70	5.85	7.40	5.55	4.00	2.58	2.43	1.65	2.10
4	4.6	2.5	3.28	4.88	5.10	5.65	6.55	4.23	2.85	2.33	1.63	1.98
5	5.0	2.5	3.15	4.42	4.95	5.40	5.30	4.38	2.98	2.23	1.60	2.05
6	5.0	2.5	3.00	5.95	5.30	6.35	4.68	4.15	2.75	2.33	3.88	2.00
7	4.5	2.5	2.92	5.75	9.85	11.30	4.27	7.15	2.95	2.20	3.05	2.33
8	3.0	2.5	2.88	4.78	6.20	9.50	4.65	5.50	3.12	2.08	3.45	3.50
9	2.0	2.5	2.90	4.40	7.20	5.75	6.40	4.70	3.05	2.00	3.63	6.55
10	2.0	2.5	2.88	5.35	6.45	5.32	5.83	4.25	3.13	1.95	3.25	4.40
11	2.0	2.5	2.78	14.88	5.15	5.20	4.75	3.95	3.35	1.90	2.98	3.05
12	2.0	2.5	2.70	25.65	8.70	4.72	4.55	3.75	3.13	1.83	11.60	2.00
13	1.8	2.5	3.05	11.85	21.45	4.50	4.30	3.47	3.02	1.90	5.95	1.88
14	1.8	2.8	4.02	7.40	9.40	5.25	4.13	3.33	2.80	2.13	4.83	1.90
15	1.8	14.3	3.85	4.98	5.40	10.00	4.02	3.17	6.18	2.00	4.03	2.00
16	1.8	10.7	3.72	4.72	4.90	7.00	3.83	3.05	5.78	2.15	4.08	6.30
17	1.8	5.0	11.58	4.45	4.55	5.90	3.95	3.00	4.10	2.33	3.15	3.85
18	1.8	4.2	19.10	3.88	4.45	5.02	4.43	2.97	3.58	3.10	2.83	2.90
19	2.0	4.2	12.10	3.75	4.30	4.72	4.12	2.88	4.73	3.65	2.68	2.53
20	3.0	4.5	5.50	4.45	4.02	4.28	4.00	2.73	4.90	4.43	2.48	2.30
21	2.8	4.4	4.72	8.65	3.88	5.40	3.78	2.57	4.27	3.73	2.30	2.15
22	2.6	3.9	4.20	7.10	3.70	15.70	3.97	2.48	4.10	3.45	2.10	2.03
23	2.6	3.52	3.90	7.35	3.62	9.70	3.80	2.53	3.55	2.88	1.98	2.05
24	2.6	3.40	3.70	5.35	4.80	5.50	3.55	2.50	3.17	2.65	1.93	1.93
25	2.5	3.22	3.62	4.70	20.00	4.72	4.15	2.47	5.70	2.25	1.93	1.83
26	2.5	3.05	4.15	4.30	7.95	4.32	4.68	2.53	4.68	2.08	2.00	1.75
27	2.5	3.08	4.42	4.08	5.52	5.60	5.23	2.47	3.98	1.98	1.98	1.68
28	2.5	3.12	6.80	3.95	4.65	10.40	4.78	2.75	3.50	1.88	1.98	1.83
29	2.5	3.12	15.00	4.00	4.45	7.75	4.73	2.65	3.13	1.88	1.98	3.53
30	2.5	3.15	11.40	10.05	.....	5.90	4.48	2.63	2.80	2.03	2.03	5.00
31	2.5	.....	5.55	5.75	.....	5.08	.....	2.82	.....	1.93	1.95	.....

LITTLE KANAWHA RIVER AT LOCK 4, PALESTINE, W. VA.

LOCATION.—At Lock 4, Palestine, Wirt County, 30 miles from Parkersburg via Little Kanawha Railroad. Reedy Creek enters on left, 1 mile above gage.

DRAINAGE AREA.—1,500 square miles (measured on 1:500,000 scale map of West Virginia).

RECORDS AVAILABLE.—April 25, 1915, to September 30, 1916. The upper and lower gages at the lock have been read under the direction of the Corps of Engineers, United States Army, as follows: November 5, 1905, to July 14, 1906; September 1–30, 1906; October 25, 1906, to date.

GAGE.—Upper gage at lock; vertical staff on right bank bolted to right side of river wall of lock just above upper gates; an inclined section of gage extends above top of lock wall; read by James Burton, lockmaster.

DISCHARGE MEASUREMENTS.—Made at cable about 1,200 feet below gage or by wading on crest of dam.

CHANNEL AND CONTROL.—One channel at all stages. Crest of Dam 4 is the control for the gage; lowest point in crest of dam is at 9.4 feet gage height, which is the point of zero flow except for variable leakage through dam, lock gates, and valves. Backwater submerges Dam 4 during extreme floods on Ohio River.

EXTREMES OF STAGE.—Maximum stage recorded during year, 21.9 feet at 8 a. m. January 12; minimum stage, 9.56 feet at 6 p. m. September 30.

Highest headwater as reported by lockmaster occurred in 1897, and was equivalent to a gage height of about 30 feet on the lower gage, which corresponds to a reading of about 24.4 on upper gage, assuming 1 foot fall at dam. Highest backwater was during the 1913 flood, when crest was at 19.2 feet on upper gage.

ICE.—Stage-discharge relation probably not affected by ice.

DIVERSIONS.—None. See "Accuracy."

REGULATION.—Flow may be affected at times by the manipulation of the pool above Dam 5, about 9.5 miles above Dam 4, and the occasional use of flashboards on Dam 4.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during year. Variable leakage through lock and dam may affect the stage-discharge relation at low stages. Data inadequate for determining rating curve. Gage read twice daily to hundredths. Previous to April 25, 1915, gage read once daily to tenths.

COOPERATION.—Base data furnished by United States Engineer Corps.

The following discharge measurement was made by Dort and Frosch:
March 9, 1916: Gage height, 12.94 feet; discharge, 6,620 second-feet.

Daily gage height, in feet, of Little Kanawha River at Lock No. 4, Palestine, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	15.69	9.86	10.46	12.36	14.78	11.34	11.57	11.09	10.57	10.10	10.71	10.67
2	17.86	9.80	10.34	13.98	15.24	11.79	11.23	10.82	10.26	9.93	10.59	10.53
3	13.78	9.80	10.45	13.98	13.07	13.17	11.12	10.72	10.17	9.86	10.46	10.46
4	11.52	9.78	10.51	12.68	12.18	12.48	12.34	11.74	10.40	9.82	10.49	10.72
5	11.09	9.75	10.50	11.40	11.87	12.02	12.26	11.49	10.17	9.79	11.14	10.77
6	11.54	9.74	10.33	11.58	12.04	12.29	11.60	11.34	10.33	9.77	10.97	10.77
7	10.98	9.72	10.28	12.56	13.88	13.74	11.19	12.44	11.70	10.20	11.16	10.81
8	10.63	9.70	10.18	11.54	13.66	15.02	11.35	13.05	10.97	10.53	11.41	10.91
9	10.44	9.68	10.16	11.36	12.25	13.08	13.09	11.93	10.53	10.70	11.24	11.13
10	10.26	9.70	10.16	11.50	13.54	12.00	13.27	11.33	11.19	10.76	11.13	12.21
11	10.18	9.70	10.16	15.18	12.54	11.82	12.56	10.95	11.32	10.68	11.53	11.61
12	10.09	9.70	10.15	21.30	13.17	11.58	11.80	10.74	10.71	10.62	11.79	11.24
13	10.00	9.74	10.18	19.20	18.89	11.28	11.36	10.52	10.41	10.57	13.35	10.07
14	9.96	9.85	10.40	14.96	17.26	11.22	11.08	10.36	10.21	10.51	11.73	10.96
15	9.90	14.80	10.68	12.39	13.22	13.62	10.95	10.28	11.37	10.37	11.37	10.75
16	9.89	15.45	10.62	11.62	11.92	13.91	10.65	10.16	13.21	10.37	11.03	12.10
17	9.85	12.60	13.82	11.34	11.62	12.78	10.63	10.16	12.28	10.77	10.80	11.27
18	9.80	11.32	18.76	10.74	11.64	12.14	10.60	10.15	10.99	11.14	10.53	10.53
19	10.95	11.80	17.84	10.46	11.44	11.64	10.77	10.09	11.48	11.40	10.32	10.21
20	11.51	12.04	13.94	10.26	11.15	11.26	10.61	10.07	12.08	11.40	10.17	10.12
21	11.12	11.80	11.72	12.86	10.98	11.18	10.47	9.99	11.47	11.79	10.05	9.94
22	10.56	11.21	11.20	13.44	10.82	15.08	10.62	9.90	11.04	11.66	9.97	9.85
23	10.39	10.82	10.92	13.85	10.70	16.82	10.72	9.99	10.93	11.74	10.02	9.76
24	10.20	10.57	10.70	12.78	10.66	13.18	10.60	9.87	10.49	11.39	10.35	9.65
25	10.09	10.51	10.59	11.82	15.76	12.25	10.62	9.84	11.32	11.19	10.55	9.65
26	10.02	10.40	11.26	11.32	16.75	11.28	11.07	9.83	12.33	11.05	10.63	9.62
27	9.98	10.33	11.42	11.03	13.08	12.44	11.57	9.74	10.97	10.97	10.71	9.62
28	9.94	10.60	12.48	10.86	11.88	16.65	12.00	9.77	10.50	10.85	10.78	9.60
29	9.93	10.56	15.54	10.82	11.45	16.22	11.68	10.23	10.23	10.77	10.75	9.62
30	9.93	10.48	17.28	13.78	.....	13.22	11.34	10.35	10.09	10.73	10.87	9.57
31	9.88	.....	13.96	13.81	.....	12.14	.....	10.70	.....	10.73	10.75	.....

SOUTH FORK OF HUGHES RIVER AT MACFARLAN, W. VA.

LOCATION.—About 80 feet above highway bridge half a mile east of Macfarlan, Ritchie County. Dutchman Run enters river on left, 3,000 feet below station.

DRAINAGE AREA.—210 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 17, 1915, to September 30, 1916.

GAGE.—Vertical staff on right bank; read by A. H. Reynolds.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Stay wire used for measurements at high stages.

CHANNEL AND CONTROL.—One channel at all stages; straight 300 feet above and 1,500 feet below bridge. Bed of stream, rock and mud. Control probably fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 19.23 feet at 6 p. m. October 1 (discharge, 8,700 second-feet); minimum stage 1.84 feet at 6 p. m. August 4 (discharge, 15 second-feet).

Highest flood known reached a stage represented by gage height about 29 feet.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation practically permanent; not materially affected by ice this year. Rating curve well defined between 100 and 2,660 second-feet and fairly well defined at other stages. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. January 18 and 20 no gage height reported and discharge interpolated. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of South Fork of Hughes River at Macfarlan, W. Va., during the year ending Sept. 30, 1916.

[Made by J. C. Dort.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 25	13.57	4,880	Feb. 26	6.25	1,260	Mar. 2	4.53	553
Do	11.78	3,800	Do	5.94	1,130			

Daily discharge, in second-feet, of South Fork of Hughes River at Macfarlan, W. Va., for the years ending Sept. 30, 1915 and 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1915.						1915.					
1		185	8	13	81	16		58	18	7	41
2		111	6	13	46	17	10	53	289	7	64
3		2,610	8	11	88	18	10	31	52	25	162
4		860	8	10	1,440	19	9	24	49	64	780
5		221	8	9	1,540	20	9	20	26	27	620
6		114	8	8	985	21	11	18	25	15	199
7		56	8	8	410	22	19	13	20	16	134
8		46	9	7	740	23	234	12	11	16	88
9		32	7	8	209	24	109	10	4	18	58
10		27	11	8	149	25	39	8	11	504	44
11		22	10	8	118	26	29	7	8	84	38
12		22	10	7	78	27	38	6	7	47	34
13		21	8	8	74	28	45	5	7	33	33
14		20	8	8	68	29	40	4	9	74	32
15		21	8	8	47	30	2,500	6	12	321	29
						31	620		13	209	

Daily discharge, in second-feet, of South Fork of Hughes River at Macfarlan, W. Va., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	6,040	38	99	144	2,880	222	247	112	209	29	21	22
2	1,730	37	104	1,680	860	504	202	90	93	28	20	21
3	542	36	151	740	620	581	174	183	61	26	17	20
4	260	34	155	321	448	356	144	780	37	24	16	17
5	183	31	130	247	466	338	162	485	40	23	32	17
6	149	31	104	985	504	485	149	274	46	21	32	17
7	116	32	88	820	1,830	1,300	104	3,100	356	20	30	20
8	68	31	78	338	1,080	740	180	1,260	274	20	33	20
9	50	31	77	429	448	410	945	448	151	20	33	22
10	48	31	69	660	581	289	660	209	945	20	33	24
11	47	30	57	3,210	429	260	338	183	900	20	33	19
12	53	32	56	5,200	2,340	195	234	112	504	17	2,550	18
13	53	33	62	3,100	5,440	176	190	84	190	17	466	18
14	50	39	207	860	1,200	180	153	62	93	17	222	25
15	48	1,830	178	338	466	2,720	144	49	1,160	19	140	660
16	46	820	183	289	466	1,080	104	45	1,340	58	74	151
17	46	274	5,080	247	356	660	102	47	410	93	39	68
18	49	247	7,480	176	581	356	90	50	207	160	35	33
19	3,210	581	1,200	104	338	274	75	39	153	73	29	24
20	1,030	860	504	867	234	192	62	33	209	47	27	20
21	410	542	260	1,630	190	234	60	32	374	49	24	22
22	204	274	94	820	147	3,210	68	30	448	47	22	20
23	132	178	149	985	121	700	75	28	234	183	21	20
24	104	112	112	392	202	374	61	27	121	74	20	20
25	77	84	129	274	5,500	247	50	26	147	40	19	18
26	66	75	660	195	1,340	202	185	25	151	28	19	17
27	60	74	581	158	523	1,030	274	25	73	27	102	16
28	54	185	780	149	274	4,360	305	31	54	25	20	16
29	49	140	4,060	144	234	1,630	222	485	38	27	20	19
30	46	121	1,630	4,240	.....	660	183	581	32	25	21	19
31	41	.....	466	860	.....	338	.....	740	.....	23	21	.....

Monthly discharge of South Fork of Hughes River at Macfarlan, W. Va., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 210 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
May 17–31	2,500	9	248	1.18	0.66
June	2,610	4	155	.738	.82
July	289	4	22.1	.105	.12
August	504	7	51.6	.246	.28
September	1,540	29	281	1.34	1.50
1915–16.					
October	6,040	41	486	2.31	2.66
November	1,830	30	229	1.09	1.22
December	7,480	56	806	3.84	4.43
January	5,200	104	987	4.70	5.42
February	5,500	121	1,040	4.95	5.34
March	4,360	176	784	3.73	4.30
April	945	50	198	.943	1.05
May	3,100	25	312	1.49	1.72
June	1,340	32	302	1.44	1.61
July	183	17	41.9	.200	.23
August	2,550	16	135	.643	.74
September	660	16	47.4	.226	.25
The year	7,480	16	447	2.13	28.97

HUGHES RIVER AT CISKO, W. VA.

LOCATION.—At Cisko, about 1 mile below junction of North and South forks and 6 miles south of Petroleum, Ritchie County.

DRAINAGE AREA.—453 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 29, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff on right bank; read by S. J. Enoch.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet below gage or by wading at the same section. Stay wire is used for measurements at high stages.

CHANNEL AND CONTROL.—One channel at all stages; straight for about 150 feet above and 500 feet below cable section. Bed of river is sand, gravel, mud, and boulders; control is probably permanent. Point of zero flow, September 28, 1915, gage height, 1.1 ± 0.3 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 21.82 feet at 12 p. m., October 1; minimum, 2.29 feet at 6 p. m. July 15.

Highest known flood reached a stage represented by gage height about 30 feet.

ICE.—Stage-discharge relation affected by ice during winter months.

ACCURACY.—Stage-discharge relation probably permanent, probably affected by ice a few days in January and February. Stages of Ohio River at Parkersburg of about 40 feet or more will probably cause backwater at the gage. Data inadequate for determining rating curve. Gage read twice daily to hundredths.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Hughes River at Cisko, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 19	A. E. Frosch	8.30	2,420	Mar. 3	J. C. Dort	6.10	1,210
Mar. 3	J. C. Dort	6.18	1,270	May 23	Leasure and Frosch	2.90	54

Daily gage height, in feet, of Hughes River at Cisko, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16.42	2.96	3.67	5.40	12.84	4.66	4.83	4.00	4.36	2.90	2.63	2.47
2	13.75	2.89	3.62	12.27	7.58	5.26	4.53	3.82	3.71	2.85	2.53	2.68
3	6.08	2.83	3.83	7.12	6.06	6.11	4.34	3.79	3.51	2.79	2.51	2.58
4	4.84	2.78	4.06	5.31	5.44	5.18	4.31	7.16	3.36	2.72	2.75	2.52
5	4.36	2.75	3.90	4.80	5.50	5.04	4.29	5.91	3.24	2.66	3.14	2.51
6	4.16	2.74	3.74	7.35	5.74	5.31	4.13	4.85	3.15	2.60	3.10	2.40
7	3.92	2.66	3.62	6.68	9.58	8.96	3.93	13.08	5.74	2.54	2.97	2.46
8	3.65	2.70	3.52	5.28	6.27	7.58	4.34	8.72	5.38	2.57	2.84	2.51
9	3.44	2.74	3.50	4.88	5.38	5.58	6.82	5.49	4.24	2.44	3.04	2.63
10	3.28	2.64	3.47	5.31	5.52	5.01	6.08	4.67	6.10	2.39	3.03	3.14
11	3.18	2.65	3.35	11.32	5.08	4.89	5.14	4.26	7.39	2.37	3.26	3.03
12	3.06	2.70	3.22	17.58	8.56	4.62	4.70	3.94	5.50	2.35	9.20	2.72
13	3.00	2.82	3.48	12.33	17.46	4.48	4.43	3.70	4.39	2.33	6.04	2.64
14	2.95	3.02	4.28	7.52	7.65	4.83	4.24	3.52	3.86	2.32	4.53	2.46
15	2.95	12.08	4.26	5.40	5.70	12.06	4.22	3.43	6.58	2.31	3.83	3.73
16	2.88	8.02	4.10	4.98	5.52	7.36	4.02	3.83	9.13	3.19	3.50	4.14
17	2.76	5.12	14.27	4.90	5.41	6.33	3.93	3.27	5.27	4.51	3.23	3.63
18	2.81	4.38	20.50	4.53	6.22	5.43	3.89	3.36	4.41	4.39	3.00	3.29
19	6.92	6.98	8.84	4.33	5.47	5.01	3.75	3.20	4.12	3.85	2.90	2.98
20	6.96	7.92	5.98	4.61	4.94	4.58	3.68	3.06	4.74	3.57	2.75	2.83
21	5.05	6.00	5.08	7.80	4.70	5.26	3.57	2.97	5.07	3.93	2.67	2.65
22	4.22	4.88	4.58	7.10	4.40	11.95	3.68	2.90	7.18	5.65	2.58	2.65
23	3.86	4.30	4.30	7.74	4.25	8.02	3.70	2.91	4.85	4.47	2.63	2.53
24	3.55	4.00	4.13	5.73	4.26	5.46	3.63	2.88	4.14	3.69	2.52	2.53
25	3.40	3.77	4.10	4.95	16.28	4.86	3.65	2.82	4.08	3.28	2.47	2.50
26	3.30	3.58	6.17	4.56	8.32	4.58	3.83	2.81	4.17	3.06	2.45	2.46
27	3.38	3.55	5.65	4.33	6.02	7.71	4.59	2.77	3.59	2.96	2.47	2.49
28	3.50	4.06	7.36	4.18	4.98	16.15	5.06	2.78	3.35	2.58	2.63	2.40
29	3.27	3.95	13.20	4.40	4.95	9.85	4.66	4.66	3.16	3.04	2.95	2.46
30	3.12	3.80	11.42	16.84	.....	6.24	4.29	5.27	3.02	2.83	3.00	2.36
31	3.00	.....	5.98	7.76	.....	5.30	.....	5.67	.....	2.74	2.87	.....

HOCKING RIVER BASIN.

HOCKING RIVER AT ATHENS, OHIO.

LOCATION.—At single-span highway bridge at Mill Street, about three-fourths mile from business section of Athens, Athens County. Margaret Creek enters on right, 3½ miles above station.

DRAINAGE AREA.—944 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 3, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff at downstream end of right abutment; read by Paul B. Casley.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Stay wire is used for measurements at high stages.

CHANNEL AND CONTROL.—Channel straight about 700 feet above and below station. Left bank overflows at gage height 17 feet and water passes around bridge. Bed of stream rocky with sand deposits near both banks. Ruins of old milldam 300 feet below gage act as control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.9 feet at 5 p. m. December 18 (discharge, 12,600 second-feet); minimum 2.80 feet September 21 and 24 (discharge, 65 second-feet).

Highest flood known reached a stage represented by gage height about 26 feet.

ICE.—Stage-discharge probably not materially affected by ice except during extremely cold weather.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice this year; decay and further destruction of milldam below station will affect relation. Rating curve well defined to 12,000 second-feet; above this point curve is an extension. Gage read twice daily to hundredths. Daily discharge obtained by applying mean daily gage heights to rating table. Results excellent.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharged measurements of Hocking River at Athens, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	B. J. Peterson	8.84	3,660	Jan. 13	A. E. Frosch	15.91	10,300
2	do	7.57	2,870	Mar. 4	do	4.70	929
3	do	6.37	2,010	9	do	7.62	3,090
Jan. 4	A. E. Frosch	7.89	3,450	9	do	6.97	2,590
13	do	15.89	10,500	24	Leasure and Frosch	4.67	919

Daily discharge, in second-feet, of Hocking River at Athens, Ohio, for the years ending Sept. 30, 1915 and 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1915.											
1	.....	1,280	3,460	280	652	16	140	7,850	1,890	970	520
2	.....	1,030	2,320	302	545	17	125	4,020	2,620	708	570
3	240	3,700	1,960	280	820	18	140	2,620	1,610	1,030	495
4	222	2,250	2,620	570	1,420	19	110	1,750	1,030	1,030	4,660
5	205	1,480	2,250	762	4,100	20	155	1,280	652	625	3,380
6	222	1,030	1,960	470	8,540	21	1,280	910	520	570	2,030
7	205	735	1,350	280	8,640	22	1,540	735	445	880	1,420
8	240	680	1,960	370	5,330	23	2,620	570	370	1,220	880
9	260	598	2,920	2,180	3,000	24	1,220	495	325	1,220	652
10	205	495	1,960	790	2,030	25	820	420	280	4,740	570
11	205	652	1,420	520	1,420	26	762	370	280	4,020	495
12	188	625	1,420	5,850	1,220	27	820	325	280	1,820	445
13	155	762	1,420	6,390	880	28	625	302	260	1,030	495
14	170	1,160	910	2,620	708	29	1,610	280	280	850	445
15	140	4,740	652	2,180	598	30	3,860	1,680	470	970	395
						31	2,030	.....	370	850	.....

Daily discharge, in second-feet, of Hocking River at Athens, Ohio, for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	4,900	212	970	3,860	8,740	1,160	2,030	520	850	280	119	110
2	4,260	205	850	6,390	5,760	1,160	1,610	495	570	268	119	92
3	1,820	212	790	4,900	2,550	1,090	1,480	520	2,620	252	102	85
4	1,220	208	735	3,700	1,820	910	1,610	850	2,180	233	92	85
5	970	191	652	2,180	1,480	850	1,480	790	1,420	219	105	85
6	1,030	198	625	2,030	1,610	1,090	1,220	625	970	188	155	216
7	762	219	570	1,820	1,680	3,380	1,030	8,740	1,160	170	110	170
8	625	226	545	1,420	1,160	3,860	1,160	10,500	1,160	161	125	110
9	545	244	545	1,160	1,160	2,320	2,180	3,540	1,090	149	110	102
10	495	252	495	1,090	1,030	1,750	2,180	1,610	850	128	110	90
11	445	236	420	3,150	970	1,350	1,610	1,160	1,220	164	79	81
12	420	276	395	8,440	2,920	1,220	1,350	910	970	167	348	83
13	395	395	470	10,300	8,340	1,160	1,090	762	652	155	256	77
14	370	395	445	10,200	4,420	1,160	1,030	652	545	180	205	90
15	370	1,540	348	4,820	2,480	2,250	910	1,160	470	158	170	116
16	370	970	370	2,480	1,890	1,680	790	1,030	470	164	143	105
17	348	598	5,850	1,750	1,680	1,420	850	790	545	146	122	83
18	325	445	12,100	1,420	2,620	1,280	850	652	520	167	110	100
19	625	4,820	10,100	1,350	3,080	1,160	708	545	570	143	85	69
20	395	5,160	3,860	1,280	2,250	1,090	680	470	470	152	98	73
21	370	2,250	2,180	2,100	2,180	1,280	652	445	2,480	161	158	65
22	348	1,350	1,610	3,700	1,960	4,260	625	445	2,480	155	105	73
23	325	850	1,350	4,340	1,890	4,660	598	520	1,160	113	95	79
24	302	708	1,420	2,620	2,180	2,620	570	1,220	680	125	85	65
25	280	625	1,540	1,960	4,020	1,890	570	708	1,160	134	83	73
26	264	545	2,180	1,610	3,300	1,480	570	495	708	137	75	67
27	248	680	1,750	1,420	2,100	3,860	762	395	470	100	98	71
28	252	1,220	6,570	1,280	1,610	8,840	850	395	268	110	348	71
29	240	1,220	10,900	2,180	1,280	9,050	708	598	348	119	280	73
30	233	1,160	9,050	6,930	.....	6,210	598	3,620	302	100	240	69
31	219	.....	7,290	6,660	.....	3,220	.....	2,030	.....	98	155	.....

Monthly discharge of Hocking River at Athens, Ohio, for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 944 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
May 3–31	3,860	110	707	0.749	0.81
June	7,850	280	1,490	1.58	1.76
July	3,460	260	1,300	1.38	1.59
August	6,390	280	1,500	1.59	1.83
September	8,640	395	1,910	2.02	2.25
1915–16.					
October	4,900	219	767	.812	.94
November	5,160	191	920	.975	1.09
December	12,100	348	2,810	2.98	3.44
January	10,300	1,090	3,500	3.71	4.28
February	8,740	970	2,700	2.86	3.08
March	9,050	850	2,540	2.69	3.10
April	2,180	570	1,080	1.14	1.27
May	10,500	395	1,520	1.61	1.86
June	2,620	268	979	1.04	1.16
July	280	98	161	.171	.20
August	348	75	145	.154	.18
September	216	65	90.9	.096	.11
The year	12,100	65	1,430	1.51	20.71

KANAWHA RIVER BASIN.

SOUTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

LOCATION.—About 1.6 miles above the confluence of north and south forks of New River and 4 miles from Crumpler, Ashe County.

DRAINAGE AREA.—325 square miles.

RECORDS AVAILABLE.—August 12, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to trees on left bank; read by J. J. Garvey.

DISCHARGE MEASUREMENTS.—Made from a boat at a section about half a mile below gage or by wading at a section 500 feet below gage.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 21.3 feet at 11 p. m. July 15; minimum stage, 1.32 feet May 27, July 7 and 8.

ICE.—Ice rarely forms in sufficient quantity to affect stage-discharge relation.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice January 19–20. Gage read twice daily to hundredths.

Discharge measurements of South Fork of New River near Crumpler, N. C., during the year ending Sept. 30, 1916.

[Made by B. E. Jones.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 24	3.00	2,450
26	2.65	1,840
27	3.26	2,760

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.32	1.56	1.62	2.31	2.14	1.84	1.70	1.51	1.53	1.60	2.59	1.82
2	2.74	1.56	1.58	2.16	3.00	1.81	1.68	1.48	1.48	1.56	3.18	1.79
3	2.11	1.54	1.55	2.11	2.86	1.84	1.66	1.48	1.46	1.68	2.54	1.82
4	1.98	1.51	1.55	1.96	2.42	1.91	1.76	1.52	1.41	1.42	2.42	1.78
5	2.69	1.53	1.52	1.90	2.25	1.84	1.70	1.61	1.39	1.38	2.54	1.71
6	2.46	1.51	1.52	1.94	2.14	1.82	1.78	1.60	1.40	1.36	2.41	1.73
7	2.16	1.50	1.54	2.21	2.07	1.82	1.78	1.50	1.56	1.33	2.42	1.75
8	2.08	1.50	1.52	2.30	1.99	1.85	1.80	1.50	1.50	1.34	2.51	1.68
9	1.96	1.50	1.51	2.12	1.91	1.87	1.80	1.44	1.48	2.46	2.51	1.70
10	1.88	1.50	1.50	1.95	1.92	1.82	1.80	1.42	1.46	6.50	2.45	1.71
11	1.82	1.50	1.48	1.90	1.89	1.80	1.90	1.42	1.42	4.16	2.28	1.70
12	1.77	1.50	1.52	1.88	1.87	1.76	1.99	1.41	1.54	2.76	2.27	1.69
13	1.75	1.52	1.55	1.90	1.86	1.75	1.89	1.40	1.66	2.40	2.18	1.70
14	1.78	1.55	1.57	1.88	1.84	1.72	1.86	1.58	1.53	2.14	2.14	1.97
15	1.85	1.74	1.52	1.86	1.82	1.70	1.74	1.42	1.86	11.9	2.32	2.60
16	1.77	1.68	1.80	1.76	1.75	1.67	1.71	1.42	2.60	16.2	2.40	2.18
17	1.72	1.57	1.92	1.73	1.77	1.64	1.69	1.40	2.34	7.0	2.18	1.76
18	1.72	1.50	3.32	1.72	1.77	1.64	1.64	1.37	1.98	.....	2.12	1.71
19	1.70	2.79	2.80	1.88	1.75	1.67	1.62	1.34	1.74	.....	2.07	1.62
20	1.94	2.25	2.12	1.85	1.68	1.71	1.60	1.36	1.67	.....	2.02	1.56
21	1.85	1.88	1.93	1.80	1.75	1.68	1.60	1.32	1.66	.....	2.00	1.51
22	1.75	1.72	1.84	2.10	1.71	1.84	1.59	1.36	1.58	.....	2.30	1.56
23	1.69	1.66	1.73	2.30	1.70	1.70	1.57	2.03	1.52	.....	2.43	1.77
24	1.64	1.63	1.72	2.00	1.98	1.62	1.56	2.06	1.53	3.00	2.08	1.62
25	1.64	1.60	1.68	1.90	2.25	1.62	1.58	1.68	1.55	2.80	1.96	1.56
26	1.63	1.60	1.95	2.04	2.07	1.60	1.60	1.54	1.74	2.68	1.89	1.59
27	1.62	1.86	2.32	2.36	1.91	2.26	1.59	1.49	1.56	3.14	1.88	1.58
28	1.61	1.79	1.80	2.18	1.76	2.14	1.52	1.48	1.49	2.68	1.87	1.53
29	1.60	1.71	3.95	2.11	1.94	1.86	1.50	1.70	1.78	2.74	1.84	2.24
30	1.60	1.67	3.52	2.06	.....	1.79	1.52	1.86	1.48	2.51	1.84	1.85
31	1.57	.....	2.58	2.00	.....	1.74	.....	1.64	.....	2.45	1.86	.....

NOTE.—Gage washed out July 16; no gage readings reported July 16–23. Crest stage of flood determined by leveling to flood marks on July 25. See station description.

NEW RIVER AT EGGLESTON, VA.

LOCATION.—At highway bridge at Eggleston, Giles County.

DRAINAGE AREA.—2,920 square miles.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1916.

GAGE.—Chain gage attached to downstream side of bridge; read by J. E. Bishop.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Stream bed composed of rock covered with silt. A rock ledge about 1¼ miles below gage probably forms the control for low stages.

EXTREMES OF STAGE.—Maximum stage recorded during year, 39.5 feet at noon July 16; minimum stage, 3.30 feet at 8 a. m., June 1. The flood of 1878 reached a stage represented by 40 feet on present gage.

ICE.—Stage discharge relation affected by ice during periods of extremely cold weather.

ACCURACY.—Stage discharge relation practically permanent; affected by ice December 14–17 and January 19–20. Flood of July, 1916, may have changed relation; additional measurements needed to determine curve after this flood. Gage read twice daily to hundredths.

Discharge measurements of New River at Eggleston, Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 26	B. J. Peterson	7.31	11,200	Aug. 4	B. E. Jones	5.74	5,610
28	do	5.68	6,260	5	do	6.19	7,190
July 18	B. E. Jones	12.97	32,600				

Daily gage height, in feet, of New River at Eggleston, Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.45	3.85	4.26	7.00	5.83	5.34	4.87	4.10	3.74	3.95	5.39	4.96
2	10.00	4.23	4.12	6.16	7.39	5.23	4.74	4.50	4.02	4.00	6.08	4.63
3	6.52	3.85	4.27	6.15	9.94	5.40	4.66	4.03	3.95	3.62	7.00	4.56
4	5.57	3.65	4.29	5.68	8.03	5.95	4.73	3.99	3.78	4.19	5.92	4.53
5	5.24	3.79	3.73	5.48	7.01	5.84	4.84	3.98	3.46	3.73	6.56	4.79
6	5.47	4.08	3.76	5.30	6.18	5.54	4.81	4.41	4.08	3.85	6.12	4.62
7	5.80	3.83	4.31	5.42	6.01	5.54	5.03	4.59	3.76	3.67	6.70	4.42
8	5.52	3.85	3.86	9.42	5.58	5.62	5.32	3.56	4.30	3.47	7.02	4.44
9	5.20	3.97	3.89	7.95	5.45	5.82	5.56	4.16	4.00	3.46	7.32	5.02
10	5.22	3.80	3.74	6.20	5.41	5.56	5.12	3.89	3.92	3.89	5.74	4.26
11	4.70	4.11	3.72	6.18	5.33	5.33	4.97	3.88	3.90	9.77	6.14	4.19
12	4.55	3.99	4.24	5.92	5.20	5.38	5.17	3.88	3.55	7.61	5.75	4.65
13	4.48	3.79	4.08	6.06	5.10	5.46	4.75	3.76	3.93	5.60	5.66	4.26
14	4.50	3.71	5.60	5.53	5.07	5.30	5.52	3.99	3.77	5.09	5.22	4.09
15	4.51	3.56	6.55	5.36	4.93	5.18	5.27	3.78	3.83	5.31	5.30	4.43
16	4.57	4.15	6.95	5.18	4.87	4.99	5.01	4.34	4.21	29.60	7.96	6.54
17	4.48	4.03	5.65	5.14	4.85	4.74	4.82	3.86	5.25	22.41	7.39	4.81
18	4.33	3.93	8.34	4.89	4.90	4.70	4.76	3.80	5.57	13.44	6.78	4.47
19	4.34	4.11	11.13	5.77	4.88	4.67	4.61	3.74	4.66	10.10	5.70	4.44
20	4.38	6.13	8.02	5.77	4.91	4.62	4.52	3.67	4.59	8.29	5.44	4.32
21	4.25	5.45	5.80	4.69	4.69	4.78	4.51	3.51	4.31	8.01	5.18	4.16
22	4.74	5.12	5.55	5.13	4.75	4.81	4.46	3.42	4.27	7.86	5.19	4.20
23	4.52	4.38	5.20	5.50	4.71	4.74	4.51	3.59	3.86	7.88	6.02	4.18
24	4.39	4.48	4.99	5.47	4.97	4.70	4.30	4.45	3.80	7.36	6.32	4.10
25	4.28	4.31	4.84	5.52	8.21	4.63	4.40	5.07	4.08	6.78	5.30	3.90
26	4.26	4.14	5.48	5.01	7.13	4.54	4.44	4.83	3.56	6.46	5.02	4.26
27	4.22	4.31	5.64	5.95	6.27	4.56	4.44	4.28	4.28	6.39	4.82	4.22
28	4.16	4.45	5.35	5.51	5.68	5.21	4.47	4.83	4.15	6.21	5.06	4.04
29	4.29	4.45	6.02	5.75	5.42	5.60	4.35	3.91	3.92	6.08	5.80	4.54
30	3.95	4.40	10.46	5.73	.....	5.22	4.20	4.39	3.96	6.24	5.33	6.16
31	4.61	.....	8.42	5.63	.....	4.98	.....	4.03	.....	5.66	4.76	.....

NOTE.—Ice reported Dec. 14, 15–17; Jan. 17 and 19–20.

NEW RIVER AT FAYETTE, W. VA.

LOCATION.—At highway bridge connecting Fayette and South Fayette, Fayette County, 850 feet above mouth of Wolf Creek.

DRAINAGE AREA.—6,800 square miles.

RECORDS AVAILABLE.—July 29, 1895, to May 22, 1901; August 11, 1902, to December 31, 1904; July 16, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by W. H. White and W. H. Eary. Elevation of the zero of gage, 838.44 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Channel straight above and below bridge, bed of stream, large boulders, some of which near the measuring section are of immense size Control composed of boulders; probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 39.8 feet at 4 a. m., July 17; minimum stage recorded, 1.02 feet at 7.30 a. m., November 10.

The flood of 1878 reached a stage represented by about 53 feet referred to present gage datum.

ICE.—Stage-discharge relation little if at all affected by ice.

ACCURACY.—Stage-discharge relation practically permanent, not affected by ice this year. Rating curve not finally determined. Gage read twice daily to hundredths

Discharge measurements were made at this station as follows:

December 9, 1915, by Frosch and Conklin: Gage height, 1.87 feet; discharge, 3,130 sceond-feet.

August 19, 1916, by B. E. Jones: Gage height, 7.47 feet; discharge, 13,800 second-feet.

Daily gage height, in feet, of New River at Fayette, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.62	1.64	3.09	11.60	9.83	7.20	7.04	4.62	3.35	2.20	5.27	3.75
2	17.27	1.46	2.67	9.52	11.65	7.01	6.24	4.22	3.03	2.30	7.07	3.00
3	13.40	1.46	2.52	8.47	15.31	7.99	5.69	4.26	2.97	2.25	10.09	3.95
4	8.85	1.51	2.31	8.14	12.21	9.25	5.29	3.79	2.97	2.37	8.17	2.85
5	6.58	1.37	2.09	7.20	9.53	8.78	6.14	3.52	3.57	2.30	6.77	2.52
6	5.34	1.48	2.00	6.62	8.91	8.43	5.29	3.42	3.13	2.33	8.20	2.92
7	5.82	1.52	2.00	6.81	8.69	8.83	4.92	3.56	3.17	1.93	7.37	2.70
8	5.37	1.45	1.92	10.95	8.56	13.53	5.89	3.79	3.33	1.87	8.55	2.42
9	4.78	1.40	1.84	.....	8.10	12.03	6.14	3.24	3.95	.....	9.85	2.25
10	4.28	1.21	1.77	9.84	8.85	9.83	6.22	2.96	4.23	1.37	8.50	2.30
11	3.70	1.54	1.70	10.08	8.41	8.18	8.56	2.96	4.25	1.67	6.55	3.10
12	3.24	1.47	.....	13.19	7.51	7.23	10.19	2.92	3.90	9.83	7.10	2.22
13	3.09	1.45	1.61	13.05	7.11	6.38	10.14	2.69	3.47	7.03	6.20	2.38
14	2.82	1.50	1.54	11.43	6.93	6.07	9.39	2.74	2.90	5.15	6.43	2.08
15	2.62	2.07	1.16	9.71	6.96	5.89	8.34	2.46	2.85	4.00	5.80	3.72
16	2.56	2.44	1.44	7.98	6.38	7.07	6.94	2.69	5.30	6.20	10.60	3.42
17	2.77	2.12	3.32	6.97	5.93	6.61	6.22	2.52	7.45	34.50	13.37	5.70
18	2.57	2.58	10.68	6.05	5.71	5.65	5.54	2.42	10.15	22.13	9.75	4.20
19	2.43	2.91	17.82	5.01	5.41	5.17	5.09	2.32	7.67	14.17	7.50	3.20
20	2.42	3.38	14.74	4.41	5.13	4.88	4.74	2.29	5.70	11.57	5.80	2.50
21	2.31	6.50	10.20	4.77	5.02	4.82	4.32	2.14	4.65	10.50	5.42	2.65
22	2.44	5.82	7.56	4.99	4.79	5.37	4.16	1.89	4.03	9.70	5.00	2.12
23	2.90	4.62	6.62	6.03	4.83	5.69	4.14	1.74	3.73	10.70	5.42	2.05
24	2.71	4.00	5.47	6.83	4.83	6.92	4.06	3.49	3.00	9.67	6.50	.....
25	2.47	3.47	4.97	6.51	12.87	6.99	4.04	5.34	2.90	8.25	6.32	1.92
26	2.29	3.20	4.92	5.83	15.19	5.76	4.36	5.62	4.40	7.20	4.92	1.80
27	2.04	3.12	6.03	5.45	11.63	7.19	5.32	4.74	3.93	6.60	3.90	1.80
28	1.91	2.90	6.61	6.19	9.15	9.96	5.72	4.99	3.67	7.05	4.08	1.62
29	1.70	2.88	10.30	7.22	7.85	9.89	5.76	3.69	3.13	7.25	3.45	5.85
30	.....	3.16	19.10	8.39	.....	8.84	5.19	3.72	2.43	6.25	4.20	5.64
31	.....	.....	16.46	9.57	.....	8.24	.....	3.76	.....	5.90	3.82	.....

NOTE.—No gage readings reported Oct. 30–31, Dec. 12, Jan. 9, and Sept. 24.

KANAWHA RIVER AT LOCK NO. 2, MONTGOMERY, W. VA.

LOCATION.—At lock No. 2, three-fourths mile below Chesapeake & Ohio Railway station at Montgomery, Fayette County. Morris Creek enters on the left about 300 feet below the gage.

DRAINAGE AREA.—8,470 square miles.

RECORDS AVAILABLE.—June 22, 1915, to September 30, 1916. Upper and lower gages at the lock have been read since December, 1887, under the direction of the United States Engineer Corps.

GAGE.—Upper gage at lock, vertical and inclined staff on right bank, short distance above upper lock gates; vertical section fastened to land wall of lock; inclined section at upstream end of paved slope; read by George Meyers, lockmaster. A chain gage fastened to downstream handrail near center of toll bridge at Montgomery is used in determining height of water surface at bridge when making current-meter measurements.

DISCHARGE MEASUREMENTS.—Made from bridge at Montgomery or by wading on the crest of the dam.

CHANNEL AND CONTROL.—One channel at all stages; straight for 300 feet above and 800 feet below bridge. Bed of river composed of rock, sand, and mud. The dam at Lock No. 2 is control for all stages, as there is a fall of about 2 feet at the dam at the maximum stage. Except for the leakage through the dam and lock, point of zero flow is at lowest point in crest of dam, which is 17.9 feet above zero of upper gage.

EXTREMES OF STAGE.—Maximum stage recorded during year, 43.5 feet at 6 a. m. July 17; minimum. 19.32 feet at 6 p. m. July 11.

Highest recorded stage occurred May 23, 1901, at 6 a. m.; upper gage 49.65, lower gage 47.70.

ICE.—Stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except as may be affected by change in leakage through lock and dam; not affected by ice. Gage read twice daily to hundredths since June 22, 1915; once daily previous to this date.

COOPERATION.—Base data furnished by United States Engineer Corps.

The following discharge measurement was made by F. Conklin:

December 31, 1915: Gage height, 28.35 feet; discharge, 62,900 second-feet.

Discharge measurements of leakage through the lock gates were made as follows by B. J. Peterson on October 11, 1915:

Upper gates closed and lower gates open: Gage height, 20.52 feet; discharge, 197 second-feet.

Lower gates closed and upper gates open: Gage height, 20.53 feet; discharge, 75 second-feet.

Daily gage height, in feet, of Kanawha River at Lock No. 2, Montgomery, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22.62	19.66	20.46	25.25	24.58	22.40	22.75	21.39	20.67	.....	20.41	20.13
2	27.85	19.62	20.27	24.10	25.38	22.40	22.18	21.09	20.42	19.89	20.23	20.01
3	26.58	19.56	20.24	23.82	26.60	22 98	21.82	20.98	20.34	19.60	23 85	19.95
4	23.72	19.60	20.17	23.32	25.98	23.50	21.52	20.86	20.60	19.87	22.93	19.90
5	22.58	19.52	20.07	22.60	24.35	23.21	21.40	20.98	20.70	19.82	22.08	19.90
6	21.56	19.48	19.97	22.12	23.50	23.20	21.30	20.92	20.45	19.88	22.63	19.85
7	21.43	19.46	19.95	22.38	23.45	25.35	21.37	20.82	20.60	19.74	22.16	19.93
8	21.34	19.50	19.85	24.30	24.15	27.85	21.54	20.90	20.71	19.61	22.35	19.83
9	21.04	19.50	19.94	25.10	23.22	25.90	21.80	20.77	20.98	19.40	23.90	19.84
10	20.74	19.44	19.84	23.72	23.42	24.32	21.88	20.64	21.10	19.38	24.20	19.75
11	20.54	19.57	19.87	24.65	23.38	23.20	23.06	20.64	21.05	19.34	22.60	20.00
12	20.28	19.52	19.74	27.35	22.82	22.55	24.68	20.48	20.90	22.93	22.45	19.80
13	20.22	19.52	19.80	26.62	22.62	22.09	25.02	20.28	20.66	22.00	22.30	19.57
14	20.05	19.51	19.72	25.62	22.74	21.86	24.12	20.16	20.22	21.00	22.23	19.75
15	20.00	19.88	19.70	24.22	22.50	22.58	23.20	20.09	20.20	20.33	21.85	20.39
16	19.96	21.46	19.68	23.18	22.23	22.75	22.55	20.08	20.75	20.37	22.77	21.47
17	20.01	20.87	20.60	22.42	21.90	22.55	22.05	19.98	21.99	40.79	26.00	21.60
18	20.00	20.61	25.25	21.62	21.71	22.00	21.70	20.10	23.54	33.25	23.87	20.90
19	19.99	20.55	29.25	21.30	21.54	21.75	21.45	19.94	22.62	27.42	22.67	20.37
20	20.11	21.15	26.00	20.98	21.34	21.50	21.20	19.92	21.58	24.27	21.85	20.05
21	20.16	22.18	22.92	21.20	21.41	21.40	21.01	19.82	21.04	23.17	21.43	19.87
22	20.15	21.95	22.10	21.55	21.50	21.82	20.92	19.73	20.69	23.07	21.63	19.83
23	20.34	21.36	22.10	22.65	21.49	22.80	20.92	19.72	20.55	24.10	21.95	19.72
24	20.13	20.94	21.60	22.88	21.48	23.00	20.86	20.24	20.32	23.47	21.88	19.67
25	20.03	20.61	21.21	22.50	25.40	22.60	20.82	21.30	20.48	22.75	21.74	19.63
26	19.98	20.44	21.35	21.99	27.45	22.03	21.19	21.36	21.40	22.05	21.07	19.60
27	19.92	20.34	21.92	21.68	25.25	22.40	21.76	21.02	21.20	21.68	20.63	19.55
28	19.86	20.38	22.25	21.79	23.78	26.00	21.60	21.06	20.60	21.67	20.47	19.67
29	19.80	20.46	24.42	22.34	22.92	25.16	21.95	20.64	20.36	21.73	20.23	20.65
30	19.79	20.52	29.72	23.30	.....	24.40	21.64	20.46	20.08	21.67	20.95	22.03
31	19.76	.....	28.20	24.00	.....	23.48	.....	20.58	.....	21.33	20.40	.....

NOTE.—No gage reading reported July 1.

NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

LOCATION.—Half a mile above confluence of North and South forks of New River and about 2½ miles north of Crumpler, Ashe County.

DRAINAGE AREA.—279 square miles.

RECORDS AVAILABLE.—August 13, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Staff gage attached to posts on right bank; read by J. J. Garvey.

DISCHARGE MEASUREMENTS.—Made from a boat at a section one-eighth mile below gage or by wading. The boat cable section was formerly at a ford one-fourth mile above gage, but was moved July 23, 1911, to a point one-eighth mile below gage.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 22.4 feet about 11 p. m. July 15; minimum stage, 1.46 feet evening July 7 and morning July 8.

The flood of April 20, 1901, reached a stage represented by about 16.4 feet on present gage.

ICE.—Stage-discharge relation affected little if at all by ice.

ACCURACY.—Stage-discharge relation practically permanent, probably affected by ice January 19 and 20. Rating curve well defined from 150 to 2,000 second-feet; beyond these limits the curve is an extension. Gage read twice daily to hundredths.

The following discharge measurements were made by B. E. Jones:

July 24, 1915: Gage height, 3.61 feet; discharge, 1,420 second-feet.

July 26, 1915: Gage height, 3.03 feet; discharge, 910 second-feet.

Daily gage height, in feet, of North Fork of New River near Crumpler, N. C., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.73	1.75	1.94	3.08	2.62	2.40	2.52	1.96	1.72	1.74	2.96	2.15
2	3.84	1.74	1.99	2.98	3.71	2.41	2.47	1.91	1.68	1.85	3.21	2.10
3	3 04	1.71	1.92	2.88	3.82	3.16	2.48	1.90	1.66	1.72	2.82	2.25
4	2.68	1.67	1.89	2.66	3 18	2 86	2 56	1 90	1 74	1 66	2.69	2.15
5	3.00	1.68	1.86	2.59	2.92	2.86	2.36	2.02	1.64	1.54	2.99	2.09
6	2.74	1.68	1.80	2.71	2.74	2.88	2.66	1.88	1.65	1.49	2.93	2.11
7	2.67	1.68	1.74	3 98	2.68	3.26	2.40	1.84	2.04	1.47	4.68	2.03
8	2.51	1.68	1.95	4.83	2.47	3.52	2.55	1.82	1.89	1.48	4.68	2.15
9	2 38.	1.68	1.82	3.73	2.42	3.06	2.58	1.82	1.84	2.27	3.41	2.16
10	2.29	1.68	1.71	3.20	2.60	2.84	2.56	1.78	1.74	5.23	3.08	2.03
11	2.20	1.64	1.83	3.08	2.33	2.72	3.14	1.77	1.70	3.24	2.91	1.95
12	2.11	1.62	1.68	2.85	2.34	2.54	3.44	1.76	1.87	2.53	3.20	1.91
13	2.08	1.72	1.98	2.91	2.27	2.46	3.24	1.72	2.06	2.24	2.97	1.93
14	2.10	1.78	1.69	2.71	2.17	2.43	2.98	1.90	1.74	2.09	2.83	2.09
15	2.06	2.06	2.16	2.58	2.08	2.41	2.74	1.76	2.65	8.80	3.60	2.81
16	1.98	2.01	2.58	2.56	2.22	2.34	2.60	1.73	3.11	14.90	3.92	2.18
17	1.95	1.82	3.16	2.56	2.16	2.24	2.48	1.73	3.00	9.10	3.45	1.97
18	1.92	1.79	6.68	2.42	2.12	2.24	2.36	1.73	2.42	5.46	3.08	1.89
19	2.03	3.93	4.52	2.44	2.10	2.48	2.28	1.70	2.14	4.21	2.90	1.94
20	2.35	2.83	3.40	2.58	2.18	2.26	2.23	1.68	2.04	5.28	2.75	1.91
21	2.27	2.50	2.90	2.47	2.15	2.36	2.22	1.66	1.99	5.07	2.52	1.98
22	2.03	2.20	2.58	2.64	2.04	2.41	2.21	1.68	1.86	5.03	3.35	1.87
23	1.98	2.20	2.46	2.76	2.02	2.39	2.11	2.78	1.74	4.15	3.03	1.87
24	1.93	2.11	2.36	2.55	2.44	2.28	2.08	2.43	1.88	3.65	2.60	1.86
25	1.89	2.04	2.32	2.47	3.26	2.23	2.21	2.06	2.22	3.34	2.49	1.81
26	1.88	2.00	2.66	2.56	2.77	2.20	2.14	1.92	1.90	3.03	2.35	1.78
27	1.87	2.30	2.36	2.61	2.63	3.39	2.16	1.82	1.76	3.25	2.29	1 77
28	1.85	2.10	3.01	2.54	2.49	3.03	2.09	1.84	1.70	2.95	2.35	1.74
29	1.82	2.04	5.38	2.58	2.52	2.88	2.03	1.87	1.82	3.25	2.28	2.21
30	1.82	2.00	4.23	2.46	.....	2.68	2.01	1.96	1.66	2.88	2.26	2.05
31	1.78	.....	3.39	2.40	.....	2.60	.....	1.88	.....	2.67	2.19	.....

REED CREEK AT GRAHAMS FORGE, VA.

LOCATION.—At highway bridge at Grahams Forge, Wythe County.

DRAINAGE AREA.—247 square miles.

RECORDS AVAILABLE.—July 29, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by J. T. Black.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Permanent; bottom solid rock.

EXTREMES OF STAGE.—Maximum stage recorded during year, 12.1 feet at noon July 16; minimum stage, 1.92 feet at 5.10 p. m. November 10, at 5.10 p. m. December 10.

ICE.—Stage-discharge relation affected by ice for short periods.

REGULATION.—Dam and gristmill just above station. Storage is small; miller states water flows over dam at all times. Flow is therefore little, if at all, modified by operation of mill.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Gage read twice daily to hundredths.

Discharge measurements of Reed Creek at Grahams Forge, Va., during the year ending Sept. 30, 1916.

[Made by B. E. Jones.

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 21	3.77	1,120
21	3.58	923
30	2.60	259

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.23	2.18	2.20	3.11	3.29	2.94	2.70	2.46	2.20	2.16	2.54	2.48
2	3.33	2.13	2.22	3.09	4.67	2.85	2.66	2.50	2.21	2.22	2.64	2.46
3	2.85	2.13	2.20	3.18	4.27	3.20	2.64	2.44	2.22	2.24	2.56	2.50
4	2.66	2.12	2.17	2.99	3.57	3.30	2.60	2.41	2.24	2.28	2.65	2.45
5	2.62	2.10	2.17	2.88	3.33	3.11	2.54	2.41	2.23	2.24	2.65	2.44
6	2.57	2.11	2.17	2.85	3.15	3.03	2.66	2.38	2.21	2.18	2.58	2.40
7	2.52	2.09	2.14	5.03	3.06	3.06	2.63	2.35	2.26	2.18	3.65	2.38
8	2.46	2.15	2.17	4.89	2.93	3.30	2.68	2.38	2.24	2.06	3.78	2.36
9	2.40	2.13	2.11	3.81	2.89	3.06	2.71	2.35	2.26	2.08	3.09	2.37
10	2.35	2.07	2.04	3.46	2.98	2.93	2.74	2.32	2.22	2.46	2.86	2.35
11	2.32	2.12	2.11	3.31	2.90	2.84	3.14	2.30	2.20	2.58	2.78	2.37
12	2.31	2.14	2.10	3.18	2.84	2.76	3.66	2.30	2.20	2.36	2.71	2.33
13	2.29	2.12	2.23	3.15	2.79	2.72	3.24	2.28	2.20	2.25	3.39	2.34
14	2.30	2.15	2.06	3.09	2.73	2.70	3.00	2.26	2.19	2.26	2.88	2.40
15	2.28	2.17	2.03	2.99	2.69	2.66	2.86	2.26	2.06	2.38	3.40	2.54
16	2.27	2.12	2.32	2.93	2.67	2.60	2.76	2.23	2.54	8.31	4.61	2.40
17	2.24	2.16	3.33	2.89	2.65	2.56	2.70	2.25	2.68	6.76	4.00	2.32
18	2.22	2.15	5.67	2.65	2.63	2.56	2.68	2.24	2.46	4.10	3.30	2.32
19	2.28	2.55	4.01	2.79	2.59	2.54	2.60	2.25	2.34	3.81	3.06	2.30
20	2.36	2.75	3.27	2.75	2.57	2.50	2.56	2.20	2.27	3.37	2.94	2.30
21	2.34	2.53	2.99	2.67	2.57	2.52	2.57	2.23	2.22	3.76	2.81	2.28
22	2.30	2.41	2.81	2.73	2.53	2.56	2.57	2.24	2.26	3.46	2.76	2.39
23	2.26	2.35	2.72	2.81	2.53	2.54	2.54	2.42	2.24	3.30	3.11	2.28
24	2.24	2.29	2.65	2.79	3.09	2.50	2.50	2.51	2.22	3.02	2.84	2.25
25	2.22	2.26	2.63	2.74	4.19	2.48	2.55	2.38	2.33	2.88	2.73	2.26
26	2.20	2.23	2.95	2.73	3.47	2.44	2.54	2.32	2.48	2.79	2.66	2.26
27	2.19	2.25	2.83	2.81	3.17	2.86	2.54	2.32	2.32	2.88	2.60	2.24
28	2.16	2.23	2.87	2.71	2.97	3.10	2.54	2.26	2.26	2.74	2.58	2.24
29	2.14	2.25	4.10	2.82	2.95	2.94	2.54	2.24	2.22	2.66	2.57	2.55
30	2.14	2.23	4.02	3.12	.....	2.84	2.42	2.27	2.24	2.59	2.54	2.48
31	2.13	.....	3.33	3.03	.....	2.76	.....	2.22	.....	2.56	2.50	.....

BIG REED ISLAND CREEK NEAR ALLISONIA, VA.

LOCATION.—About 1,200 feet above a suspension footbridge at J. P. Thomas's farm, 1½ miles from Allisonia, Pulaski County, and half a mile above the mouth of Little Reed Island Creek.

DRAINAGE AREA.—291 square miles.

RECORDS AVAILABLE.—July 31, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Vertical staff fastened to a tree on right bank; read by K. M. Thomas.

DISCHARGE MEASUREMENTS.—Made from downstream side of suspension footbridge, 1,200 feet below gage, or by wading.

CHANNEL AND CONTROL.—Channel subject to change due to deposits of silt from ore washing. Control probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 14.8 feet about noon July 16, caused partly by backwater from New River; minimum stage, 0.49 foot at 6 p. m. July 8.

ICE.—Stage-discharge relation sometimes affected by ice.

ACCURACY.—Stage-discharge relation practically permanent, affected by ice December 8, January 19–20. Gage read once daily to hundredths; after precipitation it is read twice daily.

Discharge measurements of Big Reed Island Creek near Allisonia, Va., during the year ending Sept. 30, 1916.

[Made by B. E. Jones.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 19	1.63	1,090
20	1.30	735
29	1.01	486

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.24	0.69	0.67	.....	1.49	1.15	0.78	0.65	0.73	0.84	1.18	0.85
2	1.36	.69	.68	1.13	3.05	1.05	.78	.64	.73	1.42	2.02	.84
3	.94	.67	.67	1.03	1.90	1.07	.86	.66	.74	.78	1.23	.83
4	.77	.66	.67	.98	1.35	1.03	.82	.68	.68	.66	1.08	.80
5	1.67	.67	.66	.97	1.25	1.02	.80	1.13	.54	.53	1.55	.79
6	1.04	.67	.66	.99	1.08	1.03	.97	.78	.74	.53	1.18	.78
7	1.10	.67	.62	1.63	1.03	1.03	.83	.73	1.07	.51	1.04	.77
8	1.01	.66	.72	1.27	1.02	.98	.94	.68	.84	.49	1.07	.80
9	.89	.66	.65	1.12	1.05	.93	.92	.66	.79	.78	1.06	1.10
10	.83	.65	.66	1.04	1.08	.90	.92	.60	.80	2.26	1.04	.83
11	.81	.65	.68	1.07	.99	.88	.90	.63	.74	1.33	1.35	.79
12	.72	.65	1.00	1.01	.98	.70	.89	.61	.71	1.00	1.15	.77
13	.78	.68	.91	1.05	.99	.90	.87	.60	.71	.87	1.00	.77
14	.82	.69	.77	.95	.91	.89	.79	1.50	.60	.77	1.17	.81
15	.80	.77	.86	.88	.91	.88	.66	.80	1.10	3.02	1.56	1.41
16	.82	.72	1.02	.84	.95	.73	.66	.72	1.30	11.50	1.14	.90
17	.81	.67	1.13	.72	.94	.73	.75	.63	1.00	3.36	.98	.81
18	.78	.66	3.95	.70	.93	.84	.73	.62	.95	2.04	.96	.79
19	.80	1.08	1.68	.95	.91	.85	.70	.62	.87	1.51	.90	.74
20	1.62	1.00	1.18	1.05	.80	.82	.72	.61	.64	1.18	.86	.71
21	.99	.82	1.00	1.02	.89	.88	.73	.52	1.02	1.16	.83	.71
22	.94	.76	.97	1.18	.86	.86	.80	.60	.67	1.19	.86	.70
23	.82	.73	.89	1.12	.90	.81	.72	1.88	.65	1.05	1.38	.74
24	.77	.70	.84	.96	1.50	.80	.70	1.12	.63	1.03	1.15	.70
25	.75	.70	1.00	.90	2.13	.78	.74	.87	.83	1.25	.90	.67
26	.74	.67	1.03	1.14	1.35	.78	.72	.74	.74	1.03	.83	.65
27	.74	.89	1.04	1.53	1.12	.78	.70	.70	.65	1.18	.82	.63
28	.73	.78	1.07	1.32	1.07	1.10	.68	1.00	.54	1.17	1.57	.61
29	.73	.72	4.23	1.17	1.05	.89	.65	.95	.80	1.00	1.24	1.95
30	.70	.69	1.80	1.10	.....	.87	.68	.78	.83	.97	.99	1.05
31	.68	.....	1.20	1.05	.....	.81	.....	.74	.....	.95	.90	.....

LITTLE RIVER NEAR COPPER VALLEY, VA.

LOCATION.—At highway bridge 600 feet above the mouth of Indian Creek, half a mile north of Copper Valley, Floyd County, and about 5 miles south of Childress.

DRAINAGE AREA.—195 square miles.

RECORDS AVAILABLE.—July 25, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Standard chain gage attached to bridge; read by T. A. de Hart.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.07 feet at night July 15-minimum stage, 3.26 feet July 7-8.

ICE —Stage-discharge relation affected by ice for short periods.

ACCURACY.—Stage-discharge relation probably changes during floods; affected by ic during portionsof December and January. No gage height reportedfor January 19. Rating curve not prepared. Gage read twice daily to hundredths.

The following discharge measurements were made by B. E. Jones:

July 18, 1915: Gage height, 4.74 feet; discharge, 811 second-feet.

July 31, 1915: Gage height, 3.70 feet; discharge, 256 second-feet.

Daily gage height, in feet, of Little River near Copper Valley, Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.88	3.57	3.62	4.15	4.52	3.96	3.65	3.56	3.48	3.81	3.84	3.58
2	4.56	3.59	3.59	4.07	5.99	3.95	3.66	3.56	3.44	3.54	4.21	3.54
3	4.00	3.55	3.56	3.99	4.95	4.16	3.68	3.56	3.81	3.64	4.14	3.56
4	3.83	3.55	3.53	3.87	4.29	3.98	3.74	3.61	3.66	3.44	3.86	3.54
5	4.10	3.56	3.52	3.87	4.21	3.98	3.76	4.11	3.46	3.34	4.34	3.48
6	4.26	3.58	3.69	3.98	4.15	4.04	3.74	3.76	3.41	3.31	4.11	3.48
7	4.30	3.57	3.62	4.42	4.05	3.98	3.71	3.58	4.14	3.26	4.21	3.48
8	4.20	3.57	3.59	4.42	3.97	3.94	3.78	3.56	3.68	3.26	3.88	3.74
9	4.10	3.57	3.49	4.09	3.95	3.78	3.86	3.54	3.61	3.41	3.96	3.96
10	3.88	3.57	3.47	3.99	4.03	3.77	3.84	3.51	3.64	5.41	3.88	3.64
11	3.78	3.57	3.53	4.12	3.93	3.81	4.04	3.46	3.74	4.61	3.84	3.51
12	3.77	3.57	3.39	4.07	3.85	3.78	3.94	3.46	3.58	4.16	4.41	3.48
13	3.73	3.57	3.52	4.05	3.85	3.76	3.84	3.44	3.51	3.66	3.98	3.46
14	3.70	3.57	3.66	3.96	3.82	3.74	3.74	3.44	3.38	3.64	3.81	3.58
15	3.78	3.67	3.75	3.92	3.73	3.71	3.71	3.46	3.54	6.46	3.78	3.88
16	3.73	3.62	4.02	3.88	3.75	3.68	3.66	3.51	4.36	6.81	3.94	3.61
17	3.68	3.57	4.47	3.83	3.79	3.65	3.64	3.61	3.76	5.26	3.88	3.54
18	3.70	3.53	6.82	3.57	3.77	3.74	3.58	3.56	3.58	4.76	3.76	3.48
19	3.68	4.69	4.79	.....	3.77	3.72	3.56	3.46	3.51	4.44	3.66	3.46
20	4.08	4.09	4.12	4.02	3.77	3.68	3.58	3.44	3.46	4.04	3.64	3.46
21	4.03	3.77	3.97	3.97	3.76	3.74	3.61	3.41	4.81	3.94	3.56	3.41
22	3.78	3.68	3.82	3.99	3.71	3.78	3.66	3.41	3.66	3.86	3.61	3.44
23	3.72	3.63	3.79	4.02	3.75	3.71	3.64	3.86	3.54	4.28	4.61	3.41
24	3.69	3.61	4.05	3.79	4.02	3.68	3.56	4.06	3.48	3.96	3.71	3.41
25	3.68	3.58	4.22	3.72	5.27	3.66	3.64	3.71	3.54	4.28	3.64	3.41
26	3.64	3.57	4.47	3.72	4.42	3.65	3.66	3.54	3.68	3.98	3.61	3.41
27	3.63	3.69	4.15	3.76	4.22	3.74	3.66	3.44	3.56	4.46	3.58	3.38
28	3.62	3.67	4.07	3.97	4.05	3.84	3.64	3.44	3.44	4.01	4.01	3.36
29	3.60	3.63	4.67	3.87	3.99	3.78	3.61	3.78	3.66	3.84	3.81	4.94
30	3.59	3.65	4.92	3.92	.....	3.72	3.61	3.71	3.58	3.81	3.64	4.01
31	3.58	.....	4.12	3.93	.....	3.70	.....	3.61	.....	3.71	3.61	.....

WALKER CREEK AT STAFFORDSVILLE, VA.

LOCATION.—At highway bridge at Staffordsville, Giles County, 500 feet below mouth of Whitley Creek.

DRAINAGE AREA.—277 square miles.

RECORDS AVAILABLE.—July 24, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by J. F. Durham and C. A. Deck.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 14.5 feet at 11 a. m. July 16; minimum stage, 2.65 feet at 7.30 a. m. December 15.

ICE.—Discharge relation probably not affected by ice.

REGULATION.—A dam and power plant 300 feet above station may affect flow at low water.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Gage read twice daily to hundredths.

Discharge measurements of Walker Creek at Staffordsville, Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 26	B. J. Peterson	5.69	1,260
Aug. 2	B. E. Jones	6.47	1,870
3	do	5.12	835

Daily gage height, in feet, of Walker Creek at Staffordsville, Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.63	3.06	3.29	5.13	5.63	4.49	4.23	3.65	3.20	3.21	3.83	3.29
2	5.60	3.04	3.27	4.93	7.63	4.47	4.11	3.61	3.11	3.17	7.39	3.25
3	4.58	3.02	3.23	4.73	6.83	5.04	4.09	3.58	3.58	3.41	5.07	3.23
4	4.20	3.00	3.21	4.51	5.78	5.17	3.99	3.58	4.39	3.24	5.17	3.27
5	4.00	3.00	3.22	4.36	5.28	4.94	3.91	3.58	3.69	3.14	4.91	3.21
6	3.90	3.01	3.14	4.34	5.03	4.91	3.97	3.51	3.49	3.01	4.34	3.15
7	3.79	3.00	3.08	6.63	4.78	5.17	3.99	3.51	3.46	2.99	7.10	3.13
8	3.66	2.99	3.10	7.23	4.53	5.63	4.07	3.48	3.43	2.97	5.83	3.17
9	3.55	3.00	3.12	5.88	4.43	5.11	4.11	3.49	3.37	3.09	5.00	3.10
10	3.46	2.94	3.10	5.33	4.46	4.81	4.15	3.43	3.28	4.22	4.53	3.13
11	3.40	2.98	3.10	5.06	4.30	4.61	5.33	3.43	3.24	4.17	4.27	3.12
12	3.37	2.94	3.13	4.92	4.23	4.35	5.84	3.37	3.26	3.70	4.09	3.09
13	3.33	2.96	3.16	4.80	4.18	4.25	5.30	3.34	3.18	3.49	3.95	3.10
14	3.30	2.97	3.13	4.69	4.03	4.19	4.99	3.29	3.12	3.41	3.81	3.09
15	3.30	3.09	3.82	4.53	3.88	4.08	4.64	3.28	3.17	4.93	3.75	3.33
16	3.28	3.09	3.38	4.48	3.80	3.95	4.43	3.25	4.27	10.67	4.35	3.31
17	3.24	3.12	5.48	4.33	3.83	3.84	4.28	3.21	5.19	9.59	4.19	3.17
18	3.22	3.08	9.23	3.83	3.83	3.83	4.09	3.15	4.30	7.09	4.01	3.15
19	3.18	3.76	6.58	3.98	3.82	3.77	3.97	3.15	3.91	6.62	3.83	3.10
20	3.30	4.20	5.33	4.04	3.77	3.71	3.89	3.19	3.67	6.65	3.67	3.09
21	3.28	3.89	4.74	3.90	3.71	3.80	3.87	3.18	3.59	5.55	3.59	3.07
22	3.26	3.63	4.46	3.98	3.66	4.05	3.93	3.19	3.47	6.53	3.57	3.09
23	3.20	3.54	4.23	4.05	3.65	3.98	3.85	3.44	3.33	5.53	4.29	3.01
24	3.18	3.46	4.05	3.92	4.78	3.91	3.76	3.69	3.25	5.08	3.89	3.03
25	3.14	3.36	3.95	3.93	7.83	3.87	3.73	3.53	3.55	4.71	3.69	3.01
26	3.12	3.32	4.48	4.03	5.68	3.81	3.81	3.41	4.12	4.35	3.52	2.96
27	3.10	3.35	4.33	4.98	5.19	5.31	3.79	3.31	3.76	4.21	3.45	2.94
28	3.08	3.33	4.33	4.58	4.79	5.71	3.79	3.26	3.57	4.05	3.39	2.93
29	3.08	3.36	7.42	4.65	4.69	4.99	3.73	3.27	3.41	4.28	3.42	3.47
30	3.07	3.30	6.93	5.20	.....	4.63	3.69	3.27	3.28	4.12	3.38	3.34
31	3.07	.....	5.63	5.00	.....	4.43	.....	3.23	.....	3.92	3.29	.....

WOLF CREEK NEAR NARROWS, VA.

LOCATION.—At highway bridge 3 miles above Narrows, Giles County, 1,500 feet below New River, Holston & Western Railroad bridge, and 2½ miles above mouth of Mill Creek.

DRAINAGE AREA.—223 square miles.

RECORDS AVAILABLE.—July 22, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by J. A. Hale.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed of stream is composed of small boulders and gravel Control practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 13.0 feet about noon July 16; minimum stage, 2.48 feet November 7, 8, 9, 10, and 13.

A stage of approximately 15.5 feet, referred to the gage datum, has been reached at this station; date unknown.

ICE.—Stage-discharge relation not affected by ice except for short periods during extremely cold weather.

ACCURACY.—Stage-discharge relation practically permanent; not seriously affected by ice during the year. Gage read twice daily to hundredths.

Discharge measurements of Wolf Creek near Narrows, Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 27	B. J. Peterson	4.46	790	Aug. 1	B. E. Jones	3.56	312
Aug. 1	B. E. Jones	3.52	305	2	.....do	5.86	1,760

Daily gage height, in feet, of Wolf Creek near Narrows, Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.49	2.55	2.97	4.50	4.61	3.91	3.92	3.34	2.84	2.76	3.51	2.90
2	4.52	2.53	2.95	4.38	6.12	3.89	3.82	3.30	2.78	2.74	5.30	2.88
3	3.85	2.50	2.88	4.28	5.88	4.88	3.70	3.25	2.87	2.77	4.27	2.88
4	3.50	2.50	2.83	4.08	5.00	4.65	3.60	3.28	3.34	2.79	3.84	2.87
5	2.84	2.52	2.80	3.94	4.55	4.46	3.51	3.29	3.05	2.68	3.88	2.83
6	3.14	2.52	2.76	4.44	4.88	4.51	3.64	3.22	3.00	2.64	3.74	2.84
7	3.13	2.49	2.72	6.25	4.16	5.42	3.60	3.19	3.09	2.59	4.68	2.83
8	3.05	2.49	2.75	6.80	3.96	5.88	3.68	3.22	3.00	2.56	5.58	2.78
9	2.98	2.49	2.74	5.32	3.92	4.98	3.66	3.16	2.92	2.66	4.70	2.75
10	2.92	2.48	2.71	4.58	4.08	4.57	3.60	3.11	2.88	2.71	4.18	2.72
11	2.87	2.51	2.70	4.48	3.99	4.28	4.32	3.08	2.88	3.09	3.98	2.69
12	2.82	2.50	2.68	4.36	3.91	4.02	5.25	3.04	2.85	2.90	3.82	2.65
13	2.79	2.49	2.72	4.35	3.79	3.92	5.00	3.02	2.80	2.81	3.89	2.66
14	2.77	2.50	2.72	4.30	3.68	3.82	4.54	3.01	2.76	2.85	3.82	2.66
15	2.75	2.63	2.56	4.14	3.54	3.74	4.18	2.99	2.74	2.95	3.78	2.79
16	2.72	2.76	2.88	4.04	3.50	3.65	3.95	2.95	3.38	10.32	5.52	2.86
17	2.70	2.76	5.08	3.90	3.46	3.52	3.82	2.94	3.30	8.49	4.62	2.77
18	2.67	2.68	8.08	3.52	3.45	3.46	3.66	2.92	3.16	5.97	4.17	2.69
19	2.64	2.95	6.05	3.50	3.43	3.44	3.52	2.89	3.05	5.92	3.90	2.65
20	2.70	3.37	4.76	3.50	3.34	3.39	3.46	2.88	3.00	5.35	3.68	2.64
21	2.70	3.20	4.28	3.48	3.35	3.54	3.42	2.85	2.96	5.55	3.49	2.61
22	2.67	3.09	3.92	3.59	3.32	3.60	3.40	2.81	2.86	7.92	3.40	2.61
23	2.62	3.00	3.72	3.92	3.30	3.60	3.34	3.06	2.79	5.72	3.65	2.59
24	2.61	2.96	3.58	3.86	4.08	3.54	3.26	3.22	2.93	4.65	3.37	2.58
25	2.60	2.89	3.48	3.82	6.28	3.50	3.38	3.12	3.22	4.22	3.24	2.56
26	2.58	2.85	3.72	3.72	5.12	3.46	3.42	3.04	3.35	3.97	3.16	2.53
27	2.60	2.86	3.55	3.66	4.60	4.38	3.41	2.98	3.12	3.83	3.08	2.54
28	2.60	3.02	3.68	3.58	4.32	4.68	3.40	2.90	2.99	3.99	3.07	2.54
29	2.58	3.00	6.10	3.58	4.10	3.86	3.38	2.90	2.91	4.19	3.00	2.88
30	2.56	3.00	6.20	4.01	.....	4.16	3.37	2.88	2.84	3.85	2.97	3.02
31	2.55	.....	4.93	3.95	.....	4.00	.....	3.38	.....	3.62	2.93	.....

BLUESTONE RIVER AT LILLY, W. VA.

LOCATION.—At Lilly, Summers County, 2,000 feet below mouth of Little Bluestone River.

DRAINAGE AREA.—454 square miles.

RECORDS AVAILABLE.—August 22, 1908, to January 13, 1912; July 21 to November 7, 1912; January 15, 1913, to September 30, 1916, when station was discontinued.

GAGE.—Vertical staff gage in two sections; read by W. H. Lilly.

DISCHARGE MEASUREMENTS.—Made from a boat 150 feet above gage, or by wading.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 7.85 feet at 2 p. m. August 16; minimum stage, 0.90 foot several days during November.

ICE.—Stage-discharge relation may be affected by ice during parts of December, January, and February.

ACCURACY.—Stage-discharge relation practically permanent; not seriously affected by ice during the year. Gage read to hundredths twice daily.

The following discharge measurement was made by B. E. Jones:

August 18, 1916: Gage height, 3.57 feet; discharge, 1,330 second-feet.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.65	0.98	1.39	3.70	3.00	3.39	2.57	2.18	1.64	1.51	1.92	1.32
2	4.00	.96	1.38	3.75	2.88	3.35	2.47	2.11	1.71	1.55	4.90	1.32
3	3.10	.98	1.31	3.38	2.78	3.32	2.52	2.08	1.98	1.56	4.10	1.31
4	2.90	.99	1.27	3.25	3.10	3.62	2.61	2.02	2.05	1.46	3.34	1.32
5	2.39	.98	1.20	2.95	3.55	3.64	2.56	1.98	1.98	1.39	2.59	1.28
6	2.10	.95	1.17	2.75	3.39	4.10	2.49	1.96	1.92	1.32	2.25	1.24
7	1.88	.90	1.19	3.87	3.35	5.60	2.45	1.91	1.86	1.33	2.61	1.21
8	1.70	.90	1.15	6.10	3.55	7.00	2.55	1.90	1.81	1.28	3.25	1.15
9	1.57	.93	1.10	5.00	3.75	5.10	3.20	2.02	1.76	1.26	2.90	1.10
10	1.31	.91	1.02	4.20	3.92	3.80	3.80	2.09	1.67	1.35	2.74	1.08
11	1.21	.90	.97	3.95	3.75	3.06	4.50	1.98	1.61	1.52	2.52	1.11
12	1.18	.92	.99	3.74	3.44	2.70	5.12	1.92	1.58	1.65	2.34	1.13
13	1.15	.90	1.10	4.05	3.10	2.64	4.45	1.87	1.62	1.74	2.34	1.12
14	1.11	1.36	1.11	4.05	2.94	2.59	3.84	1.77	1.71	1.84	2.78	1.08
15	1.13	1.78	1.13	3.75	2.81	2.55	3.30	1.59	1.75	2.25	3.10	1.04
16	1.11	1.82	1.27	2.98	2.62	2.54	2.99	1.59	1.81	3.35	5.95	1.24
17	1.09	1.90	3.60	2.95	2.35	2.52	2.87	1.55	1.74	5.35	4.70	1.29
18	1.03	1.97	7.00	2.75	2.21	2.58	2.78	1.53	1.65	3.90	3.51	1.26
19	1.00	1.92	5.30	2.55	2.34	2.59	2.60	1.50	1.60	3.15	2.95	1.21
20	.98	1.88	4.15	2.62	2.38	2.52	2.34	1.48	1.63	2.68	2.84	1.21
21	.96	1.85	3.55	2.44	2.41	2.49	2.24	1.50	1.61	4.22	2.78	1.17
22	.98	1.75	3.00	2.62	2.37	2.45	2.14	1.51	1.56	3.65	2.81	1.15
23	.97	1.60	3.04	2.72	2.39	2.43	2.18	1.87	1.59	3.75	2.73	1.10
24	.98	1.57	2.95	2.75	3.15	2.48	2.19	2.02	1.67	3.45	2.67	1.06
25	.97	1.51	3.09	2.61	5.95	2.49	2.21	1.94	2.40	2.85	2.46	1.01
26	.98	1.55	3.12	2.48	4.95	2.47	2.28	1.84	3.90	2.25	1.84	1.03
27	1.05	1.46	2.94	2.41	3.85	2.55	2.39	1.74	2.90	2.08	1.52	1.02
28	1.03	1.45	4.90	2.39	3.40	4.90	2.32	1.63	1.82	2.66	1.53	1.06
29	.97	1.42	7.15	2.42	3.31	3.95	2.28	1.62	1.54	2.76	1.47	1.27
30	.98	1.38	5.90	2.54	.....	3.35	2.24	1.61	1.52	2.44	1.38	1.44
31	.98	.....	4.30	2.70	.....	2.90	.....	1.59	.....	2.12	1.37	.....

GREENBRIER RIVER NEAR MARLINTON, W. VA.

LOCATION.—At Chesapeake & Ohio Railway bridge on the switch that runs to Campbell's lumber mill, 1½ miles above Marlinton, Pocahontas County, and immediately below the mouth of Stoney Creek.

DRAINAGE AREA.—408 square miles.

RECORDS AVAILABLE.—July 9, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by C. H. McCoy.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Bed at measuring section composed of coarse gravel. Control has not changed since station was established.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.2 feet at 6 p. m. October 1; minimum stage, 3.16 feet at 6.30 a. m. September 14.

ICE.—Stage-discharge relation may be affected by ice for short periods during December, January, and February.

ACCURACY.—Stage-discharge relation fairly permanent; will change only in extreme flood; affected by ice December 5–9 and 12–17. Gage read to hundredths twice daily.

The following discharge measurement was made by B. E. Jones:

August 16, 1916: Gage height, 4.24 feet; discharge, 571 second-feet.

Daily gage height, in feet, of Greenbrier River near Marlinton, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.60	3.43	3.88	5.26	5.92	4.31	4.93	4.52	4.10	3.58	3.50	3.28
2	7.40	3.43	3.84	5.90	5.81	4.23	4.63	4.47	4.00	3.62	4.62	3.28
3	.....	3.41	3.76	5.70	5.60	4.16	4.54	4.38	4.56	3.92	3.99	3.28
4	4.90	3.40	3.72	5.30	4.88	4.10	4.46	4.18	4.13	4.00	3.82	3.28
5	4.69	3.39	3.84	4.89	4.70	4.10	4.39	4.14	4.09	3.88	5.02	3.28
6	4.39	3.38	3.84	4.92	4.78	4.49	4.92	4.04	4.08	3.77	4.30	3.28
7	4.36	3.37	3.81	4.68	4.93	4.54	4.75	3.97	4.53	3.73	4.24	3.24
8	4.16	3.36	3.76	4.28	4.70	6.50	4.76	3.96	4.62	3.68	4.19	3.27
9	3.84	3.36	3.72	4.18	4.64	5.66	4.74	3.92	4.80	3.76	4.12	3.28
10	3.76	3.36	3.58	4.26	4.65	5.23	4.53	3.89	4.90	3.92	4.03	3.26
11	3.70	3.36	3.48	5.63	4.52	4.90	5.44	3.88	4.74	3.94	3.88	3.24
12	3.68	3.36	3.68	7.13	4.52	4.64	5.46	3.87	4.55	3.73	3.84	3.22
13	3.66	3.35	3.79	6.60	5.72	4.56	5.28	3.84	4.33	3.58	3.78	3.20
14	3.65	3.38	3.78	5.86	5.64	5.10	5.07	3.76	4.18	3.58	3.78	3.17
15	3.64	3.44	3.75	5.20	5.06	6.64	4.97	3.72	4.19	3.62	3.79	3.57
16	3.62	4.42	3.76	5.02	4.80	5.73	4.87	3.68	5.86	3.73	.....	4.05
17	3.54	4.20	3.80	4.88	4.64	5.18	4.58	3.67	7.04	4.28	4.28	3.62
18	3.50	4.12	7.06	.....	4.50	5.02	4.38	3.65	5.31	4.24	3.94	3.48
19	3.54	4.24	6.39	4.68	4.36	4.78	4.24	3.62	5.00	4.08	3.83	3.39
20	3.66	4.50	5.05	.....	4.27	4.46	4.16	3.59	4.76	3.98	3.75	3.33
21	3.80	4.60	4.85	4.48	4.28	4.37	4.08	3.58	4.66	4.18	3.66	3.29
22	3.78	4.57	4.69	4.52	4.18	4.97	3.98	3.56	4.48	5.23	3.59	3.28
23	3.60	4.38	4.46	4.57	4.20	6.60	3.98	4.37	4.16	4.43	3.58	3.31
24	3.57	4.19	4.37	4.24	4.36	5.96	3.97	4.66	4.00	4.30	3.58	3.35
25	3.54	4.16	4.35	4.14	5.14	5.31	4.21	4.60	3.98	4.14	3.47	3.32
26	3.51	4.06	4.48	4.10	5.18	4.93	5.23	5.30	3.96	3.95	3.44	3.29
27	3.50	4.00	4.48	4.33	4.75	4.88	5.22	5.18	3.84	3.83	3.43	3.24
28	3.48	3.98	4.59	4.33	4.58	5.50	4.94	4.73	3.73	3.88	3.36	3.20
29	3.48	3.97	7.51	4.76	4.44	5.94	4.73	4.38	3.60	4.26	3.36	4.00
30	3.45	3.93	7.20	6.63	.....	5.53	4.60	4.38	3.58	3.93	3.34	4.64
31	3.43	.....	5.51	6.43	.....	5.17	.....	4.30	.....	3.86	3.33	.....

NOTE.—No readings reported Oct. 3, Jan. 18 and 20, and Aug. 16.

GREENBRIER RIVER AT ALDERSON, W. VA.

LOCATION.—At highway bridge at Alderson, Monroe County, half a mile above the mouth of Muddy Creek.

DRAINAGE AREA.—1,340 square miles.

RECORDS AVAILABLE.—August 1, 1895, to July 15, 1906; May 10, 1907, to September 30, 1916.

GAGE.—Chain gage attached to bridge; read by W. J. Hancock.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—The channel has remained practically permanent but the construction of a new bridge in the last part of 1914 caused a change in stage-discharge relation.

EXTREMES OF STAGE.—Maximum stage recorded during year, 11.3 feet during night of October 1; minimum stage recorded, 1.85 feet September 13 at 6 p. m. and September 14.

Maximum stage since establishment of station, 19.4 feet at 6 p. m. March 27, 1913.

ICE.—Stage-discharge relation little if at all affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except as noted under "Channel and control;" not affected by ice during year. The construction of a new bridge has changed the stage-discharge relation at this station and the new rating curve has not yet been defined. Gage read to hundredths twice daily.

Discharge measurements of Greenbrier River at Alderson, W. Va., during the yaer ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 23	A. H. Horton	4.40	4,700
24	do	4.65	5,660
Aug. 15	B. E. Jones	2.65	1,000

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.19	1.99	2.39	4.47	4.82	3.31	3.69	3.16	2.82	2.27	2.50	2.04
2	9.11	1.99	2.33	4.02	5.62	3.25	3.37	3.01	2.66	2.33	5.34	2.01
3	4.99	1.97	2.32	4.33	5.05	3.58	3.23	2.86	2.63	2.49	3.87	1.99
4	3.77	1.93	2.28	4.05	4.25	3.61	3.13	1.78	2.64	2.43	3.14	1.96
5	3.27	1.91	2.23	3.52	3.85	3.44	3.04	2.73	2.75	2.64	2.96	1.92
6	2.99	1.89	2.16	3.35	3.67	3.76	3.06	2.68	2.62	2.52	3.07	1.90
7	2.77	1.90	2.18	3.27	3.65	4.56	3.23	2.60	2.63	2.21	3.06	1.90
8	2.66	1.92	2.08	3.19	3.97	3.38	3.29	2.55	2.28	2.21	3.36	1.90
9	2.51	1.89	2.04	2.95	3.81	5.41	3.30	2.50	3.21	2.18	3.23	1.92
10	2.41	1.90	2.20	2.87	4.11	4.38	3.30	2.54	3.55	2.22	3.14	1.92
11	2.37	1.90	2.14	2.22	3.94	3.82	4.57	2.48	3.43	2.41	2.97	1.96
12	2.30	1.90	2.08	7.37	3.68	2.48	5.10	2.44	3.23	2.50	2.88	1.89
13	2.25	1.88	2.06	6.57	3.76	3.28	4.77	2.40	2.98	2.36	2.87	1.86
14	2.20	1.89	2.09	5.82	4.21	3.31	4.23	2.34	2.78	2.24	2.78	1.85
15	2.18	1.94	2.16	4.65	3.98	4.00	2.77	2.33	3.95	2.21	2.58	1.96
16	2.14	2.12	2.08	3.95	3.64	3.66	3.47	2.30	5.08	2.28	3.01	2.79
17	2.12	2.46	2.16	3.65	3.47	3.86	3.23	2.29	7.04	3.40	3.38	2.55
18	2.09	2.59	2.58	3.29	3.24	3.48	3.07	2.31	5.58	3.94	3.21	2.40
19	2.12	2.56	7.12	2.99	3.11	3.26	3.97	2.31	4.15	3.34	2.83	2.22
20	2.16	3.13	4.76	2.77	2.92	3.14	2.84	2.28	3.57	2.90	2.84	2.11
21	2.17	3.23	3.86	2.87	2.84	2.95	2.77	2.24	3.18	2.70	2.66	2.02
22	2.19	3.03	3.33	2.97	2.86	3.01	2.78	2.21	2.97	2.76	2.50	1.95
23	2.23	2.86	3.10	3.12	2.82	3.98	2.77	2.42	3.83	3.68	3.59	1.96
24	2.19	2.73	2.96	3.17	2.84	4.51	2.74	3.54	2.69	3.17	3.14	1.96
25	2.14	2.64	2.77	2.96	5.04	3.90	2.80	3.46	2.69	2.90	2.70	1.91
26	2.10	2.54	2.92	2.99	5.38	3.50	3.41	3.12	2.85	2.68	2.51	1.95
27	2.09	2.50	3.09	3.19	4.34	3.30	3.85	4.69	2.60	2.54	2.34	1.96
28	2.05	2.48	3.13	3.62	3.76	3.37	3.77	3.46	2.55	2.77	2.26	1.90
29	2.05	2.48	5.35	3.67	3.46	4.87	3.56	3.02	2.42	2.98	2.21	2.55
30	2.04	2.44	9.09	4.87	.....	4.73	3.36	2.84	2.34	2.77	2.15	3.60
31	1.99	.....	5.69	5.25	.....	4.10	.....	2.91	.....	2.56	2.08	.....

GAULEY RIVER AT ALLINGDALE, W. VA.

LOCATION.—At Baltimore & Ohio Railroad bridge one-fourth mile south of station at Allingdale, Nicholas County, and immediately below mouth of Rock Creek.

DRAINAGE AREA.—248 square miles.

RECORDS AVAILABLE.—July 3, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by Harry Jones.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or from wooden bridge near depot or by wading. The bottom of the stream is rough and irregular, but with extreme care accurate measurements can be made. Measuring section at railroad bridge is poor and measurements are made at the wooden bridge near the railroad depot whenever possible.

CHANNEL AND CONTROL.—Bed consists of small boulders; control has not changed since station was established.

EXTREMES OF STAGE.—Maximum stage recorded during year, 15.13 feet at 6.35 p. m. October 1; minimum stage, 4.17 feet at 7 a. m. September 14.

ICE.—Ice may affect the stage-discharge relation for short periods during December, January, and February.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during 1915–16. Gage read to hundredths once daily.

The following discharge measurement was made by B. E. Jones:
September 4, 1916: Gage height, 4.48 feet; discharge, 48.4 second-feet.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11.16	4.80	5.18	6.25	7.35	5.80	6.20	5.85	5.45	4.90	4.57	4.55
2	8.18	4.90	5.33	8.85	7.55	5.80	6.05	5 65	5.31	4.90	6.95	5.41
3	7.28	4.48	5.28	7.30	6.20	5.81	5.80	5.46	5.70	4.90	5.40	4.39
4	6.38	4.68	5.28	6.50	6.00	5.73	5.70	5.61	6.57	4.69	5.03	4.43
5	5.90	4.60	5.13	6.15	6.19	5.63	5.55	5.95	5.95	5.15	6.35	4.36
6	5.83	4.50	5.18	6.05	5.77	5.80	5.38	5.80	6.70	4.90	5.40	4.26
7	5.15	4.63	5.28	6.00	6.85	8.10	5.35	5.61	6.15	4.75	5.41	4.18
8	5.33	4.58	5.13	6.10	6.29	9.05	5.35	5.50	6.40	4.78	5.53	4.74
9	5.25	4.60	4.98	5.95	6.46	7.00	5.32	9.45	6.47	4.59	6.46	4.62
10	5.16	4.63	4.93	5.85	6.20	6.50	5.40	5.90	6.26	4.65	7.51	4.53
11	5.08	4.61	4.78	8.25	5.99	6.15	5.57	5.69	5.87	5.25	6.26	4.37
12	5.28	4.68	5.08	10.00	6.10	5.93	5.54	5.60	5.47	4.90	7.12	4.28
13	4.94	4.73	4.98	7.90	6.58	5.90	7.00	5.39	5.40	4.65	6.27	4.23
14	4.75	4.98	4.93	7.70	6.40	6.20	6.74	5.31	5.33	4.61	7.01	4.17
15	4.45	6.13	4.88	6.60	6.20	8.40	6.35	5.30	5.52	4.58	6.19	7.50
16	4.77	6.98	4.98	6.38	6.05	7.10	5.98	5.10	6.25	4.46	5.85	6.28
17	4.70	6.18	6.48	6.50	5.95	6.70	6.55	5.21	7.30	4.77	7.15	5.32
18	6.48	5.73	10.48	6.40	5.65	6.25	6.85	5.30	6.00	5.49	5.77	5.54
19	6.45	5.83	8.58	5.60	5.64	6.18	5.55	5.14	5.52	5.10	5.57	4.55
20	5.88	6.58	7.23	5.55	5.46	5.85	5.50	5.08	5.35	5.00	5.52	4.45
21	5.64	6.33	6.33	5.95	5.65	5.95	5.39	4.99	5.35	4.90	5.36	4.72
22	5.41	6.08	5.98	6.45	5.75	6.15	5.53	4.95	5.45	7.30	5.08	4.65
23	5.34	5.88	5.83	7.65	5.75	8.65	5.65	5.05	5.21	5.75	5.80	4.60
24	5.21	5.70	5.58	6.70	5.95	7.26	5.56	6.33	5.05	5.97	5.25	4.46
25	5.15	5.58	5.81	6.20	6.25	6.65	5.75	5.56	6.18	5.35	5.07	4.52
26	5.07	5.38	6.33	5.90	6.65	6.69	6.91	5.40	6.40	5.03	4.93	4.47
27	5.03	5.46	5.98	5.85	6.28	6.70	6.70	5.93	5.62	4.95	4.80	4.42
28	5.00	5.78	6.08	5.75	5.95	6.80	6.47	5.41	5.43	4.85	4.38	4.37
29	4.94	5.63	7.98	5.90	5.75	7.25	6.30	5.30	5.20	5.13	4.76	5.40
30	4.90	5.43	8.83	7.16	.....	6.71	6.04	5.40	5.00	4.92	4.64	6.40
31	4.80	.....	7.23	6.60	.....	6.50	.....	6.10	.....	4.73	4.57	.....

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

LOCATION.—At highway bridge, known as Brocks Bridge, 2½ miles southeast of Summersville, Nicholas County, and one-eighth mile below mouth of Muddlety Creek.

DRAINAGE AREA.—686 square miles.

RECORDS AVAILABLE.—July 6, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by Mrs. G. L. Ward.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and scattered boulders with a riffle about 500 feet below gage. Control may shift at extremely high stages. One shift occurred during period of record.

EXTREMES OF STAGE.—Maximum stage recorded during year, 18.16 feet at 5 p. m. October 1; minimum stage, 3.90 feet at 6 p. m. September 13.

ICE.—Stage-discharge relation possibly affected by ice for short periods.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during year. Gage read to hundredths twice daily.

Discharge measurements of Gauley River near Summerville, W. Va., during the year ending Sept. 30, 1916.

[Made by B. E. Jones.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Aug. 22	8.38	2,710
Aug. 23	7.55	1,920
Do	7.08	1,560

Daily gage height, in feet of Gauley River near Summersville, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13.75	4.83	6.25	8.60	10.30	6.73	8.05	7.05	6.55	5.28	4.85	4.40
2	12.45	4.80	6.20	10.73	10.07	7.10	7.50	6.65	6.15	5.50	6.85	4.38
3	9.73	4.73	6.00	9.75	8.95	7.75	7.23	6.50	6.65	5.45	6.10	4.34
4	8.27	4.60	5.80	8.55	7.77	7.20	7.00	7.00	7.75	6.33	6.25	4.28
5	7.45	4.55	5.65	7.60	7.40	7.00	6.58	7.35	6.95	5.52	6.90	4.18
6	7.05	4.57	5.55	7.60	7.15	7.43	6.45	7.05	7.30	5.18	6.42	4.05
7	6.30	4.57	5.35	7.70	8.80	12.27	6.15	6.85	7.10	4.90	6.55	4.10
8	6.13	4.55	5.45	7.20	8.37	11.80	5.85	6.80	7.27	4.68	7.50	4.10
9	5.83	4.53	5.43	6.73	8.00	9.65	6.30	7.33	7.30	4.65	11.07	4.40
10	5.70	4.45	5.33	7.50	7.80	8.50	6.30	7.25	7.12	5.15	10.10	4.52
11	5.47	4.45	5.27	11.05	7.50	7.80	7.60	6.83	6.95	5.50	7.95	4.25
12	5.35	4.50	5.37	12.65	7.37	7.10	8.95	6.42	6.40	5.33	8.75	4.08
13	5.20	4.70	5.40	11.05	8.35	7.05	9.70	6.10	6.07	4.85	7.98	3.95
14	5.07	4.95	5.33	10.15	8.75	8.15	8.75	5.93	5.80	4.80	8.60	4.25
15	4.98	8.57	5.33	8.70	7.75	10.70	8.18	5.55	5.83	5.10	7.38	11.18
16	4.87	9.40	5.80	7.67	7.35	9.30	7.47	5.45	7.35	4.65	7.20	8.45
17	4.77	8.00	8.97	7.05	7.10	8.43	7.20	5.55	8.35	7.40	8.75	6.80
18	4.73	7.15	14.90	6.45	6.83	7.90	7.25	5.70	7.15	6.90	7.38	6.10
19	5.77	7.45	11.55	6.23	6.65	7.70	6.90	5.50	6.70	6.30	6.75	5.52
20	6.90	8.70	9.35	6.38	6.38	7.18	6.62	5.35	6.45	5.80	6.60	5.20
21	6.45	7.90	8.23	7.20	7.10	7.53	6.50	5.20	6.18	5.80	6.10	5.02
22	6.07	7.55	7.40	7.50	7.15	8.30	6.65	5.05	6.10	9.40	8.26	4.90
23	5.80	7.10	6.90	10.05	7.40	11.13	6.63	5.27	5.82	7.15	7.39	4.75
24	5.63	6.77	6.60	8.73	8.20	9.35	6.40	6.95	5.60	7.80	6.40	4.65
25	5.50	6.40	6.33	7.90	10.35	8.48	6.48	6.30	8.38	6.50	5.75	4.58
26	5.30	6.10	7.55	7.37	9.13	8.17	8.60	6.05	8.80	5.85	5.32	4.48
27	5.23	6.25	7.27	7.10	8.30	8.65	8.52	6.52	7.20	5.65	5.19	4.35
28	5.15	6.97	7.67	6.97	7.75	10.00	8.23	5.93	6.30	5.50	4.98	4.18
29	5.07	6.45	12.40	6.90	7.23	10.40	7.90	5.70	5.93	5.87	4.85	8.40
30	5.00	6.50	11.93	9.48	.....	9.25	7.35	6.15	5.38	5.32	4.68	8.75
31	4.87	.....	9.70	8.85	.....	8.60	.....	7.10	.....	5.07	4.55	.....

GAULEY RIVER AT BELVA, W. VA.

LOCATION.—Three-fourths mile below Chesapeake & Ohio Railway bridge at Belva, Nicholas County, one-fourth mile below mouth of Twentymile Creek, and about 5½ miles above the mouth of river at Gauley Bridge.

DRAINAGE AREA.—1,420 square miles.

RECORDS AVAILABLE.—August 25, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage fastened to trees on right bank; read by Stephen Elliott. Sea-level elevation of zero of gage, 663.53 feet.

DISCHARGE MEASUREMENTS.—Made from a boat 1,000 feet above gage or by wading.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 15.05 feet at 6 p. m. October 1; minimum stage, 1.70 feet at 6 p. m. September 8 and 9.

No records of floods previous to installation of gage are available. Maximum gage height since installation of gage, approximately 19 feet January 30, 1911.

ICE.—State-discharge relation may be affected by ice at intervals during December, January, and February.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Gage read to hundredths twice daily.

The following discharge measurement was made by B. E. Jones:

August 25, 1916: Gage height, 3.53 feet; discharge, 1.530 second-feet.

Daily gage height, in feet, of Gauley River at Belva, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	10.31	2.19	3.52	6.39	7.76	4.60	5.51	4.36	3.95	2.68	2.55	2.12
2	9.94	2.10	3.40	6.93	8.67	4.67	4.95	4.02	3.53	2.52	2.40	2.02
3	7.32	2.05	3.26	6.73	6.85	5.51	4.57	3.82	3.43	2.62	4.45	1.96
4	6.12	2.01	3.18	5.62	4.67	5.36	4.21	3.94	4.25	2.82	3.65	1.92
5	4.77	2.03	3.09	4.96	4.59	4.80	4.05	4.39	4.05	2.94	4.32	1.91
6	4.22	2.00	2.92	4.90	4.79	5.16	3.79	4.36	3.48	2.57	4.84	1.82
7	3.80	1.97	2.78	4.86	5.51	9.39	3.67	4.15	3.71	2.31	4.18	1.80
8	3.52	1.90	2.47	4.88	5.99	11.40	3.83	4.19	4.45	2.13	4.18	1.72
9	3.10	1.87	2.71	4.42	5.72	7.92	4.07	4.04	4.28	2.03	6.58	1.70
10	2.95	1.84	2.57	4.42	5.59	6.34	4.27	4.38	4.45	1.97	7.90	1.70
11	2.79	1.80	2.47	7.80	5.42	5.41	5.35	4.03	4.34	2.01	5.75	1.90
12	2.65	1.85	2.44	10.91	5.03	4.88	6.30	3.78	4.00	2.61	5.35	1.85
13	2.55	1.94	2.47	9.06	5.22	4.56	7.33	3.42	3.60	2.51	5.35	1.72
14	2.47	2.08	2.71	8.06	5.96	4.65	6.70	3.22	3.20	2.26	5.38	1.90
15	2.33	2.90	2.57	6.60	5.18	6.88	5.85	3.03	3.04	2.13	4.68	5.15
16	2.24	6.78	2.67	5.54	4.97	6.51	5.05	2.94	4.00	2.13	4.25	5.96
17	2.23	5.50	4.84	5.02	4.59	5.64	4.63	2.89	5.14	2.91	5.45	4.45
18	2.19	4.70	11.38	4.23	4.31	5.11	4.40	2.95	4.77	4.06	5.40	3.56
19	2.23	4.18	10.16	3.60	4.12	4.84	4.12	2.91	4.10	4.09	4.55	3.05
20	3.13	5.50	7.14	3.58	4.97	4.61	3.98	2.75	3.77	3.43	4.00	2.70
21	3.41	5.13	5.74	4.24	4.27	4.64	3.79	2.65	3.50	3.03	3.88	2.50
22	3.13	4.81	4.94	5.12	4.72	5.28	3.79	2.55	3.22	4.29	4.60	2.32
23	2.93	4.46	4.27	6.98	4.65	7.99	3.81	2.55	3.20	4.93	5.10	2.22
24	2.76	4.02	3.89	6.46	4.75	6.77	3.66	3.04	3.02	3.81	4.32	2.12
25	2.61	3.80	3.69	5.48	8.39	6.04	3.56	3.95	3.94	3.99	3.62	2.09
26	2.45	3.60	4.44	4.40	8.11	5.31	4.84	3.63	5.84	3.25	3.14	2.04
27	2.40	3.48	4.87	4.44	6.68	5.90	5.36	3.65	4.77	2.91	2.78	1.96
28	2.39	3.69	4.91	4.21	5.46	9.33	5.38	3.53	3.72	2.73	2.56	1.86
29	2.31	3.80	8.18	4.16	5.01	8.72	5.19	3.11	3.18	3.33	2.42	3.68
30	2.22	3.62	11.15	5.90	.....	6.75	4.76	3.23	2.89	3.03	2.31	6.10
31	2.21	.....	7.97	6.33	.....	6.15	.....	4.07	.....	2.76	2.22	.....

CHERRY RIVER AT RICHWOOD, W. VA.

LOCATION.—At highway bridge at Richwood, Nicholas County, half a mile below junction of North and South forks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 3, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by Floyd Artrip.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—The bed is composed of small boulders and practically permanent under natural conditions, but the removal of stones and boulders from the river bed in the vicinity of the point of control has at times affected the stage-discharge relation. The first stones were removed in August, 1909, and more were removed during May, June, July, and August, 1911.

EXTREMES OF STAGE.—Maximum stage recorded during year, 8.97 feet at 7 a. m. October 1; minimum stage, 1.75 feet September 12 and 13.

ICE.—Stage-discharge relation affected by ice at times during December, January, and February.

ACCURACY.—Stage-discharge relation practically permanent. Ice was reported in the shoals December 15 and January 18 and 19 but there was no appreciable effect on the stage-discharge relation. Gage read to half-tenths twice daily.

The following discharge measurements were made by B. E. Jones:

September 5, 1916: Gage height, 1.84 feet; discharge, 13.6 second-feet and 13.7 second-feet.

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.17	2.02	2.51	3.51	3.78	2.73	3.07	2.65	2.54	2.19	2.26	1.89
2	4.35	2.02	2.46	3.91	3.41	2.75	2.93	2.57	2.42	2.49	2.99	1.92
3	3.52	1.97	2.41	3.38	3.11	2.65	2.83	2.53	2.82	2.64	2.59	1.94
4	3.15	1.97	2.36	3.01	2.94	2.53	2.73	2.77	2.69	2.34	2.64	1.86
5	2.97	1.97	2.31	2.88	2.78	2.55	2.65	2.65	2.54	2.16	2.82	1.82
6	2.77	1.97	2.26	2.86	2.76	2.57	2.65	2.57	2.54	2.09	2.64	1.90
7	2.57	1.97	2.26	2.81	3.04	4.35	2.57	2.57	2.89	2.04	2.82	1.82
8	2.49	1.97	2.26	2.68	2.91	3.95	2.57	2.53	2.86	1.96	2.89	1.88
9	2.39	1.97	2.18	2.76	2.88	3.43	2.55	2.90	2.92	1.99	3.94	2.08
10	2.37	1.97	2.16	2.71	2.91	3.17	2.50	2.67	2.84	2.00	3.39	1.92
11	2.29	1.87	2.16	4.21	2.84	2.77	2.90	2.57	2.69	2.46	2.99	1.80
12	2.25	1.97	2.16	4.16	2.86	2.73	4.00	2.47	2.54	2.16	3.24	1.78
13	2.19	2.13	2.16	4.06	3.38	2.70	3.73	2.43	2.44	2.06	3.06	1.75
14	2.17	2.09	2.06	3.56	3.21	3.85	3.33	2.35	2.34	2.04	2.96	1.80
15	2.17	3.32	2.08	3.24	3.18	3.95	3.10	2.30	2.94	2.04	2.76	5.15
16	2.12	3.05	2.18	3.01	2.91	3.35	2.93	2.33	3.19	3.09	2.92	3.32
17	2.07	2.82	2.51	2.74	2.68	3.05	2.87	2.33	3.44	3.72	2.89	2.82
18	2.07	2.72	5.76	2.61	2.64	2.95	2.73	2.30	2.96	3.04	2.69	2.58
19	2.55	3.49	3.76	2.66	2.58	2.87	2.63	2.23	2.76	2.74	2.56	2.35
20	2.47	3.29	3.36	2.64	2.51	2.75	2.57	2.15	2.76	2.86	2.72	2.30
21	2.37	3.02	2.91	2.78	2.66	2.85	2.55	2.15	2.66	3.02	2.46	2.25
22	2.29	2.87	2.76	3.21	2.66	4.10	2.67	2.10	2.56	3.79	2.59	2.12
23	2.25	2.75	2.66	3.36	2.78	3.85	2.55	2.53	2.42	4.04	2.72	2.10
24	2.17	2.65	2.56	3.06	3.26	3.33	2.50	2.70	2.39	3.32	2.46	2.08
25	2.17	2.55	2.71	2.88	3.86	3.15	3.00	2.47	2.96	2.82	2.34	2.00
26	2.15	2.47	2.81	2.76	3.31	3.05	3.15	2.65	2.74	2.64	2.22	1.95
27	2.15	2.89	2.71	2.78	3.04	3.27	3.15	2.45	2.54	2.56	2.14	1.90
28	2.09	2.82	2.81	2.71	2.86	3.57	3.03	2.40	2.42	2.92	2.06	1.90
29	2.07	2.72	5.71	2.86	2.74	3.50	2.87	2.30	2.32	2.56	2.04	3.75
30	2.07	2.59	4.06	3.56	.....	3.23	2.77	2.85	2.19	2.42	1.99	2.90
31	2.07	.....	3.38	3.26	.....	3.20	.....	2.80	.....	2.29	1.94	.....

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

LOCATION.—At Miller, one-fourth mile below mouth of Youngs Creek and 3 miles below Russellville, Fayette County.

DRAINAGE AREA.—297 square miles.

RECORDS AVAILABLE.—July 17, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to trees on left bank just above the bridge, near former ferry crossing; read by J. R. Bays.

DISCHARGE MEASUREMENTS.—Made from the concrete highway bridge built in 1913, or by wading.

CHANNEL AND CONTROL.—Right bank high, wooded, not subject to overflow. Left bank fairly high, thinly wooded, and subject to overflow at extremely high stages. Current sluggish at medium and low stages. Bed rocky and control permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 11.25 feet at 7.20 a. m. December 30; minimum stage, 3.23 feet at 7.20 a. m. November 12.

ICE.—Stage-discharge relation at times affected by ice.

ACCURACY.—Stage-discharge relation practically permanent. Ice was reported by the observer January 18–19 and discharge was estimated January 18–20. Gage read to hundredths twice daily.

The following discharge measurements were made by B. E. Jones:

August 21, 1916: Gage height, 5.01 feet; discharge, 376 second-feet.

August 24, 1916: Gage height, 5.70 feet; discharge, 632 second-feet.

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.74	3.41	4.73	7.31	7.74	6.19	7.06	5.23	5.62	.....	4.43	3.64
2	9.40	3.39	4.68	7.16	8.05	5.79	.....	5.08	5.50	.....	5.80	3.58
3	7.68	3.37	4.61	6.56	7.59	5.55	6.43	5.00	5.51	.....	6.97	3.56
4	6.88	3.35	4.55	6.02	7.12	5.44	5.77	5.13	5.58	.....	6.81	3.50
5	5.70	3.33	4.49	5.75	6.72	5.39	5.38	5.16	5.52	.....	7.88	3.46
6	5.32	3.31	4.39	5.58	6.44	6.74	5.16	5.10	5.47	.....	7.47	3.40
7	4.94	3.30	4.29	5.84	6.08	10.03	5.05	4.99	5.50	3.50	6.88	3.36
8	4.36	3.29	4.18	5.91	5.81	9.61	4.99	4.78	5.54	3.47	6.69	3.36
9	4.03	3.27	4.10	.....	6.22	8.70	5.04	4.57	5.51	3.45	8.57	3.52
10	3.90	3.25	4.03	5.66	6.39	7.48	5.23	4.42	5.62	3.65	7.97	3.58
11	3.80	3.25	3.99	7.30	6.33	6.84	7.08	4.28	5.58	3.62	7.52	3.51
12	3.74	3.23	3.98	9.22	6.28	6.37	9.09	4.16	5.46	4.59	7.21	3.48
13	3.69	3.30	3.93	9.09	6.23	5.89	9.33	4.10	5.34	4.55	6.78	3.46
14	3.60	3.33	3.91	8.53	6.20	5.63	8.65	4.07	5.25	4.47	6.41	3.49
15	3.51	4.65	3.89	7.12	6.12	6.10	7.01	4.03	5.62	4.38	6.25	4.68
16	3.46	5.53	3.90	6.47	5.94	6.39	6.29	4.00	6.72	4.51	5.71	4.64
17	3.45	5.50	5.40	6.11	5.68	6.14	6.05	4.04	6.87	6.05	8.17	4.54
18	3.42	5.47	9.57	6.96	5.56	5.91	5.78	4.06	6.74	5.89	7.09	4.43
19	3.48	6.12	8.89	6.47	5.48	5.70	5.29	4.02	6.49	5.57	6.65	4.17
20	3.93	6.41	7.25	.....	5.52	5.49	5.02	3.99	6.24	5.33	6.33	3.84
21	3.86	6.19	6.77	5.98	5.54	5.37	4.81	3.92	5.91	5.15	5.63	3.64
22	3.75	5.75	6.36	.....	5.48	6.45	4.75	3.86	5.57	6.19	5.17	3.51
23	3.66	5.54	5.89	6.68	5.66	6.99	4.70	4.37	5.09	7.08	6.12	3.49
24	3.62	5.28	5.53	6.38	6.51	6.76	4.55	5.75	4.78	6.81	5.55	3.46
25	3.59	5.10	5.43	5.98	9.56	6.37	4.92	5.82	4.72	5.62	4.98	3.44
26	3.56	4.99	6.17	5.66	9.44	6.06	5.55	5.60	5.18	5.01	4.57	3.38
27	3.53	4.91	6.05	5.40	8.30	6.19	5.71	5.48	4.80	4.78	4.36	3.30
28	3.48	4.87	5.96	5.18	7.44	8.83	5.72	5.40	4.54	4.99	4.11	3.30
29	3.45	4.81	8.67	5.11	6.53	8.91	5.62	5.32	4.33	4.91	3.96	3.45
30	3.44	4.77	11.23	6.54	.....	8.41	5.45	5.48	4.04	4.76	3.84	3.40
31	3.42	.....	9.12	6.50	.....	7.73	.....	5.78	.....	4.63	3.72	.....

NOTE.—No gage height reported Jan. 9, 20, 22, Apr. 2, and July 1–6.

ELK RIVER AT WEBSTER SPRINGS, W. VA.

LOCATION.—At suspension bridge on the grounds of the Webster Springs Hotel, at Webster Springs, Webster County, one-fourth mile above mouth of Back Fork Creek.

DRAINAGE AREA.—168 square miles.

RECORDS AVAILABLE.—July 1, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Vertical staff attached to right abutment of bridge; read by Cherry Woodzell.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge, or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders with a riffle about 400 feet below gage. There is one channel at the gage, but a wooded island divides the stream about 200 feet below the gage at medium and high stages. Control practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 6.97 feet at 8 a. m. December 18; minimum stage, 1.57 feet September 12–14 and 27–28.

ICE.—Stage-discharge relation sometimes affected by ice.

ACCURACY.—Stage-discharge relation practically permanent. Ice reported January 18–21 and discharge estimated. Gage read to hundredths twice daily.

The following discharge measurements were made by B. E. Jones:

September 6, 1916: Gage height, 1.71 feet; discharge, 22.3 second-feet; gage height 1.69 feet; discharge, 23.8 second-feet. The latter measurement was at the better section.

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.67	1.97	2.59	3.59	4.07	2.77	3.09	3.02	2.95	2.09	1.87	1.77
2	4.32	1.97	2.49	4.79	3.87	2.87	2.95	2.85	2.72	2.05	3.47	1.79
3	3.67	1.97	2.45	3.92	3.55	2.95	2.85	2.72	2.92	2.72	2.87	1.82
4	3.17	1.97	2.37	3.47	2.97	2.80	2.76	2.89	3.02	2.82	2.47	1.87
5	2.85	1.96	2.29	3.17	2.95	2.39	2.71	2.95	2.97	2.52	2.62	1.77
6	2.69	1.96	2.27	3.27	2.87	2.87	2.67	2.82	3.09	2.27	2.62	1.72
7	2.49	1.95	2.27	3.12	3.72	5.07	2.59	2.77	2.99	2.12	2.72	1.77
8	2.41	1.93	2.25	2.97	3.37	4.77	2.57	2.74	3.07	2.07	2.65	1.97
9	2.33	1.93	2.27	2.75	3.19	3.82	2.57	3.02	2.97	2.02	2.87	1.97
10	2.28	1.87	2.27	2.79	3.09	3.42	2.55	2.97	2.95	2.05	3.37	1.92
11	2.23	1.87	2.27	5.52	2.97	3.12	2.89	2.82	2.85	2.22	3.07	1.77
12	2.15	1.87	2.27	4.82	2.97	2.92	3.62	2.66	2.72	2.05	4.02	1.62
13	2.07	2.19	2.27	4.59	4.37	2.87	3.75	2.55	2.47	2.05	3.27	1.57
14	2.01	2.32	2.27	4.12	3.52	3.97	3.47	2.46	2.37	2.07	3.37	1.72
15	1.97	4.02	2.27	3.57	3.29	4.82	3.29	2.41	2.52	1.99	3.67	5.67
16	1.97	3.62	2.25	3.22	3.02	4.02	3.09	2.37	2.67	1.87	3.62	4.12
17	1.97	3.12	3.92	3.17	2.89	3.27	3.02	2.82	3.72	2.27	3.67	3.62
18	1.95	2.89	6.67	3.15	2.79	3.23	3.02	2.72	3.07	2.72	3.12	3.12
19	3.62	2.97	4.52	3.17	2.69	3.09	2.89	2.61	2.77	2.52	2.82	1.97
20	3.27	2.42	3.67	3.22	2.65	2.92	2.79	2.53	2.72	2.22	2.62	1.97
21	2.95	3.25	3.27	3.37	2.92	2.87	2.69	2.41	2.85	2.67	2.42	1.97
22	2.65	3.15	3.02	3.42	2.97	3.77	2.82	2.32	2.72	2.47	2.32	1.92
23	2.51	2.97	2.82	3.87	2.98	4.47	2.99	2.33	2.52	2.87	2.42	1.97
24	2.45	2.82	2.66	3.49	3.07	3.77	2.89	3.37	2.39	2.62	2.47	1.97
25	2.35	2.65	2.65	3.25	4.07	3.45	3.52	2.92	3.12	2.42	2.12	1.92
26	2.27	2.49	3.22	3.02	3.65	3.29	3.92	3.59	3.09	2.27	2.05	1.72
27	2.22	2.72	3.02	2.87	3.35	3.27	3.79	3.52	2.82	2.17	1.97	1.57
28	2.18	2.75	3.17	2.79	3.05	3.52	3.62	3.07	2.55	2.32	2.05	1.57
29	2.13	2.67	5.02	2.87	2.92	3.72	3.39	2.82	2.37	2.17	1.97	3.12
30	2.08	2.65	4.57	3.62	.....	3.49	3.19	2.17	2.22	2.02	1.87	3.57
31	2.01	.....	3.82	3.75	.....	3.22	.....	3.22	.....	1.97	1.82	.....

ELK RIVER AT GASSAWAY, W. VA.

LOCATION.—At the highway bridge about 300 feet above the Coal & Coke Railroad bridge in the northeastern part of Gassaway, Braxton County, just above the mouth of Little Otter Creek.

DRAINAGE AREA.—578 square miles.

RECORDS AVAILABLE.—July 1, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by H. A. Hays. From July 1, 1908, to May 5, 1913, the gage was at the Coal & Coke Railroad bridge. Sea-level elevation of zero of gage, 796.31 feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 17.48 feet at 5 p. m. December 18; minimum, 1.80 feet at 7 a. m. September 8.

The flood of January 30, 1911, reached a stage of 30.4 feet, as determined by levels from flood marks on September 13, 1912.

ICE.—Ice may affect the stage-discharge relation for short periods.

ACCURACY.—Stage-discharge retation practically permanent; not affected by ice during the year. Rating curve not yet prepared. Gage read to hundredths twice daily.

The following discharge measurement was made by B. E. Jones:

September 2, 1916: Gage height, 1.91 feet; discharge 87 second-feet.

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.28	2.20	2.88	6.27	4.99	5.67	5.17	5.52	3.53	2.82	2.03	1.93
2	9.92	2.14	2.81	5.70	4.57	5.51	5.09	4.40	3.18	2.76	2.87	1.92
3	8.32	2.06	2.74	5.24	4.27	5.38	5.02	4.38	3.05	3.20	3.70	1.90
4	7.63	2.00	2.56	4.72	4.67	5.14	4.77	4.48	2.98	3.73	3.64	1.88
5	6.66	1.98	2.49	4.45	4.90	5.05	4.25	4.56	2.89	3.26	3.31	1.86
6	5.98	1.96	2.46	4.85	5.31	5.59	3.96	4.67	2.78	3.10	3.10	1.84
7	5.02	1.95	2.43	5.02	5.58	11.84	3.71	6.76	2.62	2.50	2.76	1.82
8	4.06	1.94	2.42	4.91	5.41	14.63	3.63	5.32	3.22	2.35	2.47	1.84
9	3.64	1.93	2.40	4.70	5.29	8.73	3.57	4.58	3.71	2.32	2.32	2.24
10	3.10	1.91	2.38	5.25	5.21	6.63	3.53	4.52	3.64	2.28	3.94	2.43
11	2.38	1.90	2.36	8.72	5.13	5.87	3.49	4.61	3.51	2.26	5.00	2.19
12	2.30	1.92	2.32	14.67	5.02	5.86	3.43	4.55	3.26	2.23	7.18	2.10
13	2.22	1.98	2.30	9.77	4.95	5.81	3.79	4.46	2.90	2.14	6.89	1.88
14	2.15	2.55	2.46	7.55	4.79	5.57	3.79	4.36	2.84	2.08	5.94	2.00
15	2.09	8.01	2.52	6.30	4.99	5.39	4.97	4.24	3.16	2.06	4.60	6.79
16	2.08	7.76	2.66	5.84	5.21	5.21	4.89	3.62	4.21	2.15	4.50	6.62
17	2.06	5.99	4.38	5.33	4.94	5.11	5.09	2.87	4.47	2.47	4.42	6.04
18	2.04	5.49	14.90	4.63	4.63	4.89	4.63	2.83	4.59	3.54	4.34	5.85
19	2.88	5.03	13.48	4.38	4.33	4.57	4.41	2.77	4.50	3.89	3.75	5.72
20	4.67	4.82	9.31	4.31	4.11	4.30	4.15	2.70	4.16	3.11	3.16	5.54
21	4.04	4.61	7.47	4.15	3.97	4.15	4.09	2.63	3.82	2.75	3.00	5.41
22	3.71	4.20	6.38	4.87	3.81	9.84	3.78	2.57	3.70	2.70	2.76	5.22
23	3.04	3.90	5.82	5.01	3.61	8.36	3.68	2.53	3.62	2.64	2.46	5.00
24	2.92	3.71	5.15	4.89	4.07	7.57	3.55	2.48	3.53	3.28	2.36	4.83
25	2.71	3.67	4.75	4.79	5.29	6.16	4.31	2.50	3.45	2.88	2.29	4.71
26	2.54	3.34	4.36	4.70	6.63	6.01	6.72	3.05	3.38	2.63	2.24	4.61
27	2.54	3.08	4.78	4.63	6.58	5.93	6.41	2.94	3.31	2.35	2.14	4.38
28	2.42	3.14	6.69	4.71	6.36	6.57	5.95	2.88	3.20	2.28	2.08	7.20
29	2.28	3.02	12.44	4.84	6.02	7.45	5.59	3.00	3.09	2.17	2.04	5.58
30	2.26	2.94	11.00	5.73	.....	6.64	5.30	2.92	2.89	2.10	2.00	4.90
31	2.24	.....	8.03	5.33	.....	5.81	.....	3.82	.....	2.06	1.96	.....

ELK RIVER AT CLENDENIN, W. VA.

LOCATION.—At highway bridge in town of Clendenin, Kanawha County, immediately above mouth of big Sandy Creek.

DRAINAGE AREA.—Not measured

RECORDS AVAILABLE.—June 27, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by J. W. Riley. Sea-level elevation of zero of gage, 588.69 feet.

DISCHARGE MEASUREMENTS.—Made from downstream tide of bridge or by wading.

CHANNEL AND CONTROL.—Practically permanent. There is no sharply defined control section but the principal control is below the mouth of Big Sandy Creek. The discharge and drainage area of Big Sandy Creek should therefore be included in estimating discharge at this station.

EXTREMES OF STAGE.—Maximum stage recorded during year, 17.74 feet at 5. p. m. December 18; minimum stage, 2.32 feet at 5 p. m. November 12.

The high water of 1889 reached a stage represented by about 31.9 feet referred to gage datum.

ICE.—Stage-discharge relation affected by ice at times during December, January and February.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Gage read to hundredths twice daily.

The following discharge measurements were made by B. E. Jones.

September 1, 1916: Gage height, 2.46 feet; discharge, 157 second-feet; Gage height, 2.41 feet; discharge, 150 second-feet.

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Daily gage height, in feet, of Elk River at Clendenin, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13.22	2.64	3.78	7.16	11.43	5.52	6.21	5.37	3.74	3.37	2.51	2.47
2	11.80	2.56	3.72	8.33	11.16	6.84	5.49	4.95	3.73	3.13	2.44	2.47
3	7.53	2.58	3.66	10.83	8.62	8.98	5.89	4.73	3.84	3.03	2.37	2.40
4	5.96	2.51	3.66	7.54	6.96	7.79	6.67	5.65	3.63	2.89	2.97	2.36
5	5.34	2.50	3.58	6.28	6.34	6.73	5.70	5.81	3.80	3.41	3.59	2.38
6	5.11	2.46	3.48	6.30	6.36	6.84	5.13	5.75	3.97	3.45	3.15	2.38
7	4.38	2.44	3.36	6.68	9.34	9.50	4.75	5.58	4.61	3.15	3.71	2.34
8	3.96	2.40	3.34	6.14	8.70	15.24	5.36	5.69	4.55	2.93	3.27	2.64
9	3.63	2.36	3.31	5.60	7.74	9.98	7.29	5.23	4.09	2.79	3.99	3.56
10	3.30	2.38	3.26	5.66	7.65	7.35	7.25	6.09	3.99	2.63	4.89	2.92
11	3.20	2.36	3.16	11.38	6.50	6.46	7.69	5.49	3.88	2.55	5.31	2.78
12	3.04	2.32	3.06	17.20	6.10	5.74	6.81	4.91	3.69	2.54	6.91	2.54
13	2.92	2.44	3.02	13.46	12.28	5.40	6.45	4.49	3.47	2.59	7.29	2.48
14	2.84	2.80	3.29	10.32	12.46	5.20	6.23	4.17	3.28	2.73	5.79	2.65
15	2.76	9.80	3.50	8.05	8.20	7.13	5.63	3.97	3.31	2.67	5.46	3.58
16	2.70	10.85	3.49	6.45	6.64	9.62	5.21	3.78	4.81	2.75	4.71	7.16
17	2.62	7.32	6.34	5.85	5.88	7.79	5.11	3.68	4.07	2.91	4.59	5.26
18	2.61	5.60	15.44	5.00	5.21	6.70	5.29	3.57	3.88	3.01	5.12	4.28
19	2.68	4.83	16.30	4.44	4.84	6.08	5.11	3.65	6.35	3.07	4.57	3.66
20	3.00	4.88	9.28	4.62	4.91	5.60	4.89	3.57	6.40	4.57	4.01	3.30
21	4.56	5.17	7.27	6.00	4.90	5.80	4.67	3.39	4.99	3.91	3.66	3.04
22	4.14	4.88	4.95	6.75	4.88	7.82	4.77	3.26	4.45	3.75	3.39	2.88
23	3.79	4.58	4.48	8.27	5.04	9.34	4.65	3.21	3.95	3.62	3.15	2.78
24	3.52	4.38	4.56	7.80	5.17	8.81	4.62	3.13	3.69	3.97	3.01	2.70
25	3.32	4.11	4.40	6.68	12.94	6.84	4.95	2.99	4.99	3.52	2.85	2.62
26	3.15	3.90	4.84	5.76	10.42	5.94	5.59	3.59	7.62	3.23	2.78	2.58
27	3.04	3.86	5.30	5.19	7.99	7.25	7.37	3.36	5.83	3.03	2.77	2.50
28	2.96	3.84	6.35	4.79	6.44	15.62	7.35	4.27	4.71	2.83	2.71	2.45
29	2.94	3.82	11.82	4.76	5.90	11.25	6.64	3.78	4.13	2.67	2.68	2.46
30	2.82	3.92	14.45	6.58	.....	8.72	5.96	3.51	3.69	2.56	2.63	5.33
31	2.72	.....	9.63	7.48	.....	7.02	.....	3.44	.....	2.51	2.57	.....

COAL RIVER AT BRUSHTON, W. VA.

LOCATION.—At Chesapeake & Ohio Railway bridge at Brushton, Boone County, 500 feet above the mouth of Brush Creek.

DRAINAGE AREA.—379 square miles.

RECORDS AVAILABLE.—June 23, 1908, to August 5, 1916. The flood of August 9 destroyed the gage and record August 6 to 9, and the gage was not replaced.

GAGE.—Standard chain gage attached to bridge; read by G. W. Fitzpatrick. Sea-level elevation of the zero of the gage, 633.83 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL OR CONTROL.—Bed of stream is of gravel and small boulders, practically permanent. There was one shift between the establishment of the station and the flood of August 9, 1916.

EXTREMES OF STAGE.—Maximum state recorded during year, 36.3 feet at 3 p. m. August 9; minimum stage, 1.27 feet at 4.30 p. m. November 10, 7 a. m. and 5 p. m. November 11.

ICE.—Stage-discharge relation little if at all affected by ice.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Gage read to hundredths twice daily.

The following discharge measurement was made by B. E. Jones.

August 30, 1916: Gage height, 1.79 feet; discharge, 75.8 second-feet.

Daily gage height, in feet, of Coal River at Brushton, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.26	1.40	2.34	4.15	5.68	4.24	3.68	3.37	2.28	1.97	1.67	.....
2	5.28	1.36	2.25	4.04	5.12	4.20	3.40	3.15	2.06	1.93	1.76	.....
3	3.64	1.34	2.22	3.91	4.52	5.18	3.34	3.02	2.09	1.97	1.67	.....
4	2.93	1.32	2.18	3.80	4.28	4.76	3.18	3.10	2.34	1.84	1.62	.....
5	2.58	1.31	2.13	3.69	4.55	4.69	3.04	3.04	2.24	1.76	2.03	.....
6	2.38	1.29	2.08	3.88	4.29	4.66	2.96	3.00	2.12	1.70	.....	.....
7	2.20	1.31	2.02	4.17	4.82	6.32	2.86	2.95	3.00	1.61	.....	.....
8	2.05	1.29	2.02	4.10	4.51	5.55	3.24	3.11	3.39	1.56	.....	.....
9	1.93	1.28	1.95	4.08	4.46	4.86	4.34	3.12	2.92	1.54	.....	.....
10	1.84	1.28	1.92	4.35	4.42	4.55	3.99	2.96	2.64	1.52	.....	.....
11	1.77	1.27	1.94	6.12	4.16	4.31	5.96	2.82	2.58	1.50	.....	.....
12	1.74	1.34	1.93	5.52	4.15	4.16	6.38	2.64	2.39	1.44	.....	.....
13	1.66	1.41	1.93	5.16	4.11	4.10	5.07	2.56	2.24	1.40	.....	.....
14	1.62	1.48	2.06	4.82	4.02	4.06	4.16	2.42	2.13	1.46	.....	.....
15	1.58	3.59	1.94	4.33	3.94	4.05	3.68	2.30	2.10	1.92	.....	.....
16	1.54	4.17	2.02	4.11	3.91	3.96	3.33	2.26	2.28	1.87	.....	.....
17	1.52	3.44	4.54	3.91	4.32	3.94	3.19	2.24	2.40	2.60	.....	.....
18	1.50	2.63	9.56	3.76	3.80	3.97	2.96	2.16	2.36	2.52	.....	.....
19	1.64	2.60	7.12	3.66	3.82	3.98	2.83	2.07	2.38	2.30	.....	.....
20	1.66	2.92	4.62	3.72	3.80	4.02	2.72	1.99	2.52	2.36	.....	.....
21	1.62	3.02	3.74	3.74	4.36	3.72	2.66	1.92	2.42	2.51	.....	.....
22	1.57	2.73	3.29	3.92	4.43	4.16	2.84	1.92	2.25	2.30	.....	.....
23	1.50	2.57	3.02	4.34	4.01	4.12	2.74	1.94	2.12	2.06	.....	.....
24	1.50	2.43	2.83	4.28	4.01	4.08	2.64	1.94	2.01	1.90	.....	.....
25	1.44	2.31	2.72	4.06	5.40	4.04	2.78	1.93	2.98	1.79	.....	.....
26	1.43	2.17	3.14	3.89	5.32	3.65	2.89	1.87	3.33	1.70	.....	.....
27	1.42	2.23	3.37	3.76	4.81	4.75	3.19	2.28	2.74	1.62	.....	.....
28	1.38	2.45	3.80	3.67	4.52	5.75	3.70	1.73	2.42	1.56	.....	.....
29	1.37	2.48	7.76	3.79	4.39	5.24	3.83	1.72	2.22	2.18	.....	.....
30	1.36	2.46	6.92	4.48	.....	4.76	3.60	2.08	2.08	1.97	.....	.....
31	1.42	.....	4.86	4.34	.....	4.48	.....	2.34	.....	1.81	.....	.....

COAL RIVER AT FUQUA, W. VA.

LOCATION.—At W. C. Hoy's passenger ferry, half a mile below Fuqua railroad station, Kanawha County, and 1 mile below mouth of Fuqua Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 12, 1911, to September 30, 1916, when station was discontinued.

GAGE.—Staff gage in two sections on right bank; read by W. C. Hoy.

DISCHARGE MEASUREMENTS.—Made from boat 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Channel is sandy, but control is practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 36.6 feet at 11 p. m. August 9; minimum stage, 0.49 feet at 5 p. m., July 13.

ICE.—Stage-discharge relation probably affected by ice for short periods.

ACCURACY.—Stage-discharge relation practically permanent. Gage read to hundredths twice daily. Ice reported December 19-21.

The following discharge measurement was made by B. E. Jones:

August 29, 1916: Gage height 1.67 feet; discharge, 180 second-feet.

Daily gage height, in feet, of Coal River, at Fuqua, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.90	0.93	2.25	5.83	11.76	4.24	4.65	4.27	1.71	1.18	0.70	1.38
2	8.51	.92	2.08	5.22	11.80	4.50	4.10	3.78	1.38	1.08	.61	1.38
3	4.56	.86	2.00	4.64	8.17	7.30	4.24	3.44	1.17	1.12	.64	1.42
4	3.22	.84	1.96	4.04	6.38	7.50	3.82	3.98	1.68	1.04	.58	1.38
5	2.67	.82	1.84	3.73	5.76	6.40	3.50	3.64	1.56	.90	.61	1.36
6	2.35	.80	1.77	4.20	6.22	6.00	3.32	3.45	1.41	.81	1.76	1.29
7	2.10	.80	1.72	5.23	9.09	7.86	3.10	3.40	1.86	.72	3.81	1.24
8	1.84	.79	1.63	5.18	8.18	12.70	4.48	3.62	3.56	.66	3.22	1.20
9	1.66	.78	1.60	4.74	6.84	8.05	7.44	3.50	2.82	.62	17.60	1.16
10	1.54	.78	1.56	5.59	7.39	5.67	6.33	3.22	2.38	.62	19.80	1.18
11	1.44	.78	1.52	12.32	6.58	4.94	7.87	2.96	2.12	.59	6.76	1.09
12	1.36	.83	1.52	14.96	5.50	4.10	9.21	2.68	1.95	.62	5.84	1.02
13	1.29	.89	1.64	11.20	6.29	3.79	7.68	2.38	1.67	.50	8.36	.99
14	1.22	1.27	1.72	9.52	5.30	3.66	5.68	2.16	1.46	.54	7.62	.96
15	1.15	6.18	1.71	6.83	4.60	3.61	4.64	2.00	1.52	.63	5.52	2.88
16	1.14	6.98	1.68	5.40	4.43	3.45	3.92	1.85	1.49	1.12	7.72	2.48
17	1.10	4.30	6.12	4.72	4.18	3.32	3.70	1.84	1.94	1.20	16.74	2.49
18	1.08	3.18	16.56	4.58	3.90	3.34	3.28	1.71	1.76	2.01	7.85	1.88
19	1.36	2.84	13.36	6.35	4.06	3.40	2.99	1.55	2.57	1.64	4.97	1.58
20	1.31	3.10	7.56	5.70	3.87	3.40	2.82	1.40	2.70	2.49	3.77	1.40
21	1.33	3.22	5.20	5 55	3.97	3.58	2.68	1.32	2.12	2.00	3.02	1.28
22	1.25	3.03	4.18	4.24	4.34	3.84	3.04	1.24	1.78	1.67	2.68	1.20
23	1.18	2.72	3.70	6.26	4.24	3.98	2.84	1.30	1.48	1.39	2.48	1.18
24	1.12	2.46	3.58	6.65	4.20	3.64	2.67	1.29	1.31	1.18	2.26	1.17
25	1.08	2.26	3.10	5.32	6.96	3.47	3.04	1.25	1.22	1.00	2.08	1.10
26	1.02	2.06	3.82	4.46	9.26	3.28	3.20	1.15	4.44	.86	1.92	1.02
27	1.03	2.02	4.13	3.92	7.14	4.94	3.68	1.05	2.80	.80	1.78	.98
28	1.00	2.15	5.00	3.54	5.44	9.39	4.76	1.09	2.06	.71	1.76	.94
29	.98	2.26	11.86	3.82	4.74	9.03	5.79	1.10	1.64	.84	1.65	1.00
30	.94	2.30	13.77	6.36	.....	6.99	5.01	1.38	1.40	.96	1.56	2.24
31	.93	.....	8.14	6.52	.....	5.50	.....	1.58	.....	.83	1.46	.....

LITTLE COAL RIVER AT McCORKLE, W. VA.

LOCATION.—At McCorkle, Lincoln County, on Coal River branch of Chesapeake & Ohio Railway. Cobb Creek enters river on left about 400 feet below the station.

DRAINAGE AREA.—375 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 23, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff on left bank just below McCorkle Hotel; read by F. M. Priestly.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet above inclined section of gage or by wading. Stay wire used for measurements at high stages.

CHANNEL AND CONTROL.—One channel at all stages; slightly curved above and below cable section. Both banks are high and do not overflow. Bed of stream composed of loose sand; but control is probably fairly permanent. Point of zero flow, August 26, 1916, gage height 0.8 ± 0.1 foot. Flow of Cobb Creek affects stage at gage and should be included in station.

EXTREMES OF STAGE.—Maximum stage recorded during year, 28.57 feet at 6 p. m. August 9; minimum stage, 1.74 feet at 5 p. m. August 3 and 6 a. m. August 4.

Highest known flood previous to August, 1916, reached a stage represented by gage height 22.5 feet.

ICE.—Stage-discharge relation probably not affected by ice except during severe winters.

ACCURACY.—Stage-discharge relation probably permanent, not affected by ice during year. Data inadequate for determining rating curve. Gage read twice daily to hundredths.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Little Coal River at McCorkle, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	B. J. Peterson	2.53	84	Dec. 19	F. Conklin	7.29	2.820
Dec. 8	Frosch and Conklin	2.48	93	Aug. 28	B. E. Jones	2.46	59

Daily gage height, in feet, of Little Coal River at McCorkle, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.65	1.95	2.72	4.15	8.65	3.60	3.73	3.71	2.47	2.45	1.80	2.26
2	4.23	1.92	2.70	3.90	7.25	4.10	3.65	3.53	2.38	2.40	1.75	2.33
3	3.40	1.90	2.66	3.67	5.22	5.40	3.70	3.37	2.37	2.40	1.75	2.45
4	3.32	1.87	2.63	3.48	4.88	3.43	3.53	3.53	2.65	2.35	1.79	2.38
5	2.98	1.85	2.60	3.40	4.30	4.48	3.35	3.40	2.53	2.29	1.86	2.38
6	2.85	1.84	2.55	3.72	5.50	4.32	3.27	3.35	2.45	2.19	2.40	2.27
7	2.72	1.84	2.50	4.18	6.30	6.30	3.20	3.35	3.13	2.09	2.80	2.20
8	2.60	1.84	2.50	3.92	5.00	7.50	3.85	3.43	3.20	2.00	2.70	2.15
9	2.52	1.85	2.50	3.96	5.35	5.00	5.75	3.35	2.97	2.00	9.18	2.32
10	2.45	1.85	2.45	4.40	5.40	4.20	4.85	3.23	2.88	1.98	13.35	2.17
11	2.38	1.84	2.40	8.75	4.75	3.80	5.45	3.18	2.80	1.97	4.85	2.05
12	2.31	1.92	2.46	8.05	4.22	3.52	5.55	3.05	2.73	1.93	3.75	1.98
13	2.26	2.16	2.58	7.30	4.52	3.42	4.73	2.97	2.60	1.86	5.00	1.93
14	2.22	2.42	2.60	5.82	4.05	3.40	4.07	2.85	2.52	2.15	4.85	1.90
15	2.14	5.82	2.45	4.40	3.90	3.35	3.70	2.77	2.53	1.98	3.75	3.05
16	2.11	4.48	2.68	4.05	3.78	3.25	3.45	2.75	2.55	2.55	6.47	2.75
17	2.04	3.62	5.88	3.78	3.68	3.25	3.38	2.73	2.68	2.60	9.43	2.58
18	2.16	3.20	11.80	3.32	3.55	3.28	3.22	2.68	2.65	2.67	4.98	2.45
19	2.45	3.10	7.05	3.40	3.60	3.35	3.10	2.57	2.98	2.65	3.60	2.23
20	2.50	3.18	4.66	3.48	3.50	3.30	3.03	2.50	3.07	2.25	3.25	2.17
21	2.48	3.20	3.80	3.50	3.50	3.45	3.02	2.48	2.83	2.73	3.05	2.15
22	2.40	3.12	3.47	3.68	3.51	3.55	3.08	2.47	2.67	2.53	2.90	2.10
23	2.32	3.00	3.26	5.05	3.50	3.60	3.05	2.50	2.55	2.58	2.83	2.03
24	2.25	2.89	3.12	4.68	3.55	3.42	3.00	2.50	2.44	2.43	2.73	1.95
25	2.20	2.81	3.00	3.95	4.55	3.35	3.24	2.43	2.55	2.33	2.63	1.88
26	2.18	2.74	3.54	3.68	5.40	3.28	3.33	2.35	2.44	2.20	2.53	1.83
27	2.18	2.70	3.58	3.48	4.62	4.65	3.57	2.35	2.97	2.10	2.50	1.80
28	2.10	2.79	4.00	3.40	3.95	6.00	4.38	2.28	2.80	2.00	2.49	1.80
29	2.06	2.80	8.95	3.48	3.82	5.28	4.78	2.45	2.63	1.87	2.46	1.78
30	2.03	2.80	7.60	4.42	.....	4.48	4.10	2.65	2.50	1.90	2.40	1.75
31	2.00	.....	5.12	4.38	.....	4.00	.....	2.65	.....	1.88	2.33	.....

POCATALICO RIVER AT SISSONVILLE, W. VA.

LOCATION.—At highway bridge at the post office at Sissonville, Kanawha County. one-fourth mile below mouth of Grapevine Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 26, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge; read by B. N. Sisson.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Sand and gravel; may shift during floods.

EXTREMES OF STAGE.—Maximum stage recorded during year, 24 feet at noon October 1; minimum stage, 1.60 feet at 6 p. m. September 6, and 6 p. m. September 7.

The flood of June 27, 1910, reached a stage of 33 feet referred to gage datum. Some of the flood water passed around the gage.

ICE.—Stage-discharge relation may be affected by ice for short periods in December, January, and February.

REGULATION.—A dam and small power plant above the station modify the low-water flow.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Gage read to hundredths twice daily.

The following discharge measurement was made by B. E. Jones:
August 31, 1916: Gage height, 2.58; discharge, 55.8 second-feet.

Daily gage height in feet of Pocatalico River at Sissonville, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	21.10	2.13	2.82	4.25	10.95	3.65	3.81	3.21	2.24	1.88	1.90	1.84
2	13.94	2.18	3.07	6.37	6.60	5.85	3.52	3.08	2.24	1.92	1.76	2.14
3	4.68	2.10	3.37	4.85	5.21	5.95	5.27	2.98	6.96	1.98	1.75	1.95
4	3.73	2.08	3.37	6.37	4.76	4.19	6.22	6.56	3.90	1.96	2.28	1.82
5	5.88	2.03	3.09	3.55	4.83	4.77	4.47	4.61	3.46	1.85	3.08	2.14
6	5.33	2.00	2.92	4.59	6.39	5.29	3.85	3.78	3.44	1.84	3.01	1.80
7	3.68	2.04	2.79	5.01	8.99	8.27	3.95	5.06	7.66	1.76	3.28	1.62
8	3.18	1.98	2.66	4.12	5.19	6.89	6.37	4.64	4.46	1.78	2.64	1.91
9	2.93	1.86	2.67	3.97	5.76	4.59	9.88	3.66	3.48	1.71	2.68	5.00
10	2.66	1.70	2.67	5.76	6.59	4.05	7.87	3.28	4.11	1.74	2.18	3.30
11	2.56	1.90	2.51	13.55	4.79	4.02	5.82	3.04	3.81	1.82	3.56	2.80
12	2.28	2.00	2.47	16.60	5.57	4.69	4.49	2.71	3.21	1.75	5.96	2.65
13	2.18	2.80	2.67	12.02	17.35	3.49	3.85	2.58	2.74	1.76	5.14	2.35
14	2.23	3.77	3.12	6.55	6.75	3.55	3.55	2.58	2.61	2.11	4.58	2.22
15	2.38	18.80	3.02	4.32	4.77	6.49	3.12	2.50	4.12	1.68	3.21	3.60
16	2.06	9.49	2.89	4.09	4.39	5.82	3.10	2.48	4.66	2.76	2.88	2.98
17	2.10	4.48	10.04	3.85	4.29	5.09	3.11	2.36	4.04	2.54	2.94	2.92
18	2.10	3.60	20.45	3.43	4.41	4.25	2.94	2.36	3.36	2.58	2.78	2.60
19	6.38	5.38	10.24	3.23	3.99	3.79	2.81	2.81	6.61	3.16	2.66	2.40
20	6.58	5.48	4.95	5.55	3.95	4.31	2.76	2.16	5.66	3.01	3.55	2.25
21	4.58	4.60	3.75	6.19	3.75	6.82	2.74	2.14	3.78	2.58	2.74	2.30
22	3.56	3.63	3.67	7.89	3.47	10.29	3.20	2.28	3.20	3.51	2.18	2.33
23	3.13	3.26	3.35	8.09	3.42	5.12	3.06	2.34	3.26	3.28	2.14	2.15
24	2.90	3.00	3.19	4.79	3.42	4.29	2.96	2.18	2.61	2.78	2.48	2.18
25	2.70	2.89	3.12	4.07	8.87	3.77	3.38	2.06	2.62	2.44	2.06	2.15
26	2.60	2.80	4.72	4.43	6.65	3.46	3.54	2.08	2.46	2.36	1.91	2.10
27	2.48	2.90	4.83	3.42	4.87	6.89	4.31	2.06	2.44	2.04	1.94	2.10
28	2.40	3.38	7.72	3.39	4.12	19.60	4.64	1.91	2.15	2.01	2.71	2.10
29	2.36	3.10	14.75	4.66	3.92	11.76	3.81	1.94	2.06	1.86	2.41	2.35
30	2.13	3.00	9.34	9.49	.....	5.49	3.54	2.36	2.04	1.84	2.01	2.12
31	2.28	.....	4.90	5.73	.....	4.32	.....	2.91	.....	1.84	2.19	.....

RACCOON CREEK BASIN.

RACCOON CREEK AT ADAMSVILLE, OHIO.

LOCATION.—About 200 feet above the covered highway bridge at Adamsville, Gallia County, 5 miles southwest from Hocking Valley Railroad station at Bidwell. Indian Creek enters on right 1¼ miles above station.

DRAINAGE AREA.—537 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 25, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff on left bank 200 feet above bridge; read by Irene Call.

DISCHARGE MEASUREMENTS.—Made from covered highway bridge or by wading.

CHANNEL AND CONTROL.—Straight for about 500 feet above and 600 feet below bridge. Bed of stream composed of mud, sand, and gravel. Principal control at ruins of old mill dam 1,200 feet below bridge; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.8 feet at 6 p. m. February 29 (discharge, 5,730 second-feet); minimum stage, 1.95 feet at 6.30 p. m. September 30 (discharge, 32 second-feet).

High-water marks indicate maximum stage of about 24.5 feet.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Rating curve well defined between 70 and 5,800 second-feet; beyond these limits, the curve is an extension. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. Records excellent.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Raccoon Creek at Adamsville, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	B. J. Peterson	16.38	5,340	Dec. 10	F. Conklin	3.38	312
3	do	15.70	5,160	Mar. 10	J. C. Dort	6.85	1,220
8	do	3.82	381	31	F. Conklin	13.72	4,110
Dec. 10	A. E. Frosch	3.38	296	Apr. 1	do	10.20	2,480

Daily discharge, in second-feet, of Raccoon Creek at Adamsville, Ohio, for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					16		296	632	158
1		404	109	148	17		188	429	168
2		1,380	148	138	18		228	228	158
3		1,560	138	109	19		188	178	158
4		1,050	148	138	20		168	158	632
5		632	128	527					
					21		118	109	478
6		632	109	1,340	22		100	148	284
7		478	97	2,050	23		109	178	168
8		853	87	2,930	24		109	218	138
9		1,120	90	2,610	25	138	109	178	109
10		937	100	1,080					
					26	128	81	332	92
11		659	429	502	27	109	78	527	239
12		527	198	356	28	100	76	228	332
13		578	937	272	29	109	95	178	261
14		332	1,410	296	30	404	138	148	198
15		429	853	218	31		148	158	

Daily discharge, in second-feet, of Raccoon Creek at Adamsville, Ohio, for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	5,580	118	632	4,190	5,630	853	2,300	380	1,630	118	47	68
2	5,010	109	578	4,050	5,370	909	1,180	332	825	128	49	70
3	5,110	100	527	3,430	4,850	937	1,050	356	1,740	128	55	62
4	4,850	97	527	2,430	3,200	825	937	1,020	881	98	48	56
5	2,180	100	502	1,520	1,340	769	797	714	687	92	52	58
6	632	90	429	1,480	1,340	797	687	659	632	86	52	44
7	502	87	332	1,480	1,630	1,630	578	1,590	797	84	56	92
8	404	94	332	1,310	1,340	2,050	797	2,740	605	77	52	71
9	356	87	308	995	1,020	1,820	1,050	3,160	527	69	429	55
10	239	87	284	1,020	937	1,280	1,150	2,970	632	77	168	62
11	228	97	250	2,930	853	909	1,020	1,700	825	69	118	51
12	188	109	228	5,320	2,010	825	853	714	527	58	90	46
13	168	118	284	5,580	4,800	714	714	478	453	84	100	47
14	272	198	356	5,530	4,950	769	632	404	332	68	84	64
15	128	1,280	308	5,320	4,290	2,930	552	356	284	57	68	62
16	128	1,820	296	4,290	3,290	3,060	478	308	218	69	62	62
17	178	1,560	3,620	1,850	2,090	2,350	453	356	228	77	52	52
18	158	881	5,840	966	2,090	1,630	453	284	272	98	54	49
19	178	2,520	6,510	853	2,260	1,480	404	228	527	69	52	44
20	332	3,060	6,510	853	2,050	1,210	356	208	527	188	138	56
21	453	3,480	5,840	1,450	1,700	1,480	308	178	687	109	228	56
22	261	2,520	4,290	2,050	1,480	2,880	284	168	769	84	158	46
23	198	1,450	1,280	2,390	1,310	3,060	272	178	1,240	69	109	48
24	158	853	995	2,180	1,180	2,560	261	178	1,050	77	94	43
25	158	578	1,080	1,450	2,010	1,560	284	188	502	66	77	50
26	148	502	1,310	1,080	2,470	1,150	308	178	308	71	71	55
27	138	527	1,520	909	2,090	3,160	429	168	228	62	158	47
28	128	659	1,630	797	1,380	4,690	552	478	188	49	168	57
29	109	825	3,110	1,210	966	5,630	578	2,300	148	44	138	62
30	118	742	4,290	5,010	.....	5,470	453	2,520	138	44	94	33
31	109	.....	4,540	5,010	.....	4,490	.....	2,470	.....	51	73	.....

Monthly discharge of Raccoon Creek at Adamsville, Ohio, for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 537 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
June 25–30	404	100	165	0.307	0.07
July	1,560	76	445	.829	.96
August	1,410	87	291	.542	.62
September	2,930	92	543	1.01	1.13
1915–16.					
October	5,580	109	929	1.73	1.99
November	3,480	87	825	1.54	1.72
December	6,510	228	1,890	3.52	4.06
January	5,580	797	2,550	4.75	5.48
February	5,630	853	2,410	4.49	4.84
March	5,630	714	2,060	3.84	4.43
April	2,300	261	672	1.25	1.40
May	3,160	168	902	1.68	1.94
June	1,740	138	614	1.14	1.27
July	188	44	81.3	.151	.17
August	429	47	103	.192	.22
September	92	33	55.6	.104	.12
The year	6,510	33	1,090	2.03	27.64

GUYANDOT RIVER BASIN.

GUYANDOT RIVER AT WILBUR, W. VA.

LOCATION.—At site of Hutchinson Lumber Co.'s suspension bridge at Wilbur, three-fourths mile below Manbar, Logan County. Rich Creek enters river on left about 600 feet above the station.

DRAINAGE AREA.—791 square miles (measured on map of West Virginia, scale 1:500,000).

RECORDS AVAILABLE.—July 13, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff on right bank; read by Allie Smith. Vertical section fastened to downstream corner of right timber crib pier; inclined section is about 10 feet downstream.

DISCHARGE MEASUREMENTS.—Made from cable installed between towers of former bridge in February, 1916, or by wading.

CHANNEL AND CONTROL.—Straight for about 1,000 feet above and 500 feet below station. Bed of river composed of solid rock, bowlders, and mud; control probably permanent; point of zero flow, gage height 0.00±0.5 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 14.0 feet at 7.30 p. m. August 16; minimum stage, 1.60 feet, November 11–15.

Highest flood known reached a stage represented by gage height about 24 feet.

ICE.—Stage-discharge relation probably not affected by ice except in severe winters.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during the year. Rating curve not yet determined. Gage read twice daily.

COOPERATION.—Base data furnished by United States Engineer Corps.

The following discharge measurements were made by B. J. Peterson and J. C. Dort, respectively.

October 6, 1915: Gage height, 3.11 feet; discharge, 4.24 second-feet.

February 12, 1916: Gage height, 5.35 feet; discharge, 2,290 second-feet.

Daily gage height, in feet, of Guyandot River at Wilbur, W. Va., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.32	1.80	3.45	5.55	7.50	4.60	4.45	4.40	2.84	2.86	2.55	2.12
2	6.14	1.78	3.10	5.20	7.75	5.50	4.35	4.05	2.63	2.70	2.49	2.09
3	4.12	1.72	3.20	5.10	6.15	7.40	4.10	4.00	2.85	2.57	3.75	2.06
4	3.60	1.70	3.00	4.90	5.50	6.85	4.00	4.00	3.14	2.48	3.17	2.02
5	3.18	1.70	2.88	4.65	5.30	6.05	4.00	4.00	3.05	2.35	3.27	2.03
6	3.10	1.72	2.81	4.90	5.00	5.50	3.93	3.65	2.83	2.23	6.10	2.03
7	2.71	1.66	2.88	5.75	5.60	7.05	3.85	3.60	4.19	2.12	6.30	1.97
8	2.36	1.66	2.60	7.15	6.00	8.55	4.30	3.65	4.90	2.06	6.25	1.89
9	2.20	1.66	2.60	6.15	6.00	6.60	5.45	3.60	4.00	2.00	5.05	1.87
10	2.04	1.64	2.53	5.65	6.35	5.75	5.05	3.50	3.85	1.97	4.58	1.89
11	1.98	1.60	2.55	6.50	6.15	4.85	7.38	3.50	3.87	1.97	4.20	1.85
12	2.10	1.62	2.62	9.35	5.42	4.00	7.80	3.43	3.55	2.05	4.15	1.80
13	2.11	1.70	3.00	7.70	5.00	4.00	6.50	3.30	3.28	2.04	6.35	1.74
14	2.05	1.75	3.19	7.00	4.76	4.05	5.45	3.17	3.10	2.04	6.50	1.72
15	2.00	5.25	3.50	5.85	4.00	4.15	4.80	2.94	2.93	2.04	5.40	1.93
16	2.00	5.73	3.83	5.25	3.85	3.85	4.25	2.69	3.17	2.75	11.85	4.20
17	1.96	4.35	8.45	5.00	3.80	3.68	4.00	2.77	4.03	3.99	9.40	3.53
18	1.94	3.85	11.50	4.80	3.95	3.68	3.93	2.70	4.10	4.20	6.55	2.83
19	2.04	3.75	8.50	4.40	4.00	3.80	3.83	2.63	3.85	3.87	5.47	2.50
20	2.25	4.00	5.85	4.00	3.90	3.75	3.67	2.52	3.50	4.20	4.99	2.27
21	2.00	4.15	4.75	3.86	4.00	4.25	3.60	2.43	3.20	4.10	3.80	2.14
22	1.98	4.00	4.00	4.25	4.00	5.95	3.65	2.41	2.90	3.87	3.38	2.05
23	1.92	3.80	4.00	5.40	4.00	5.75	3.57	2.55	2.71	4.33	3.01	1.99
24	1.90	3.52	3.90	5.80	4.30	5.00	3.50	2.72	2.56	3.59	3.00	1.93
25	1.80	3.45	3.90	5.15	7.70	4.70	3.50	2.80	6.15	3.83	2.86	1.90
26	1.73	3.40	4.10	4.90	7.45	4.45	3.67	2.55	6.80	3.17	2.52	1.90
27	1.72	3.30	4.08	4.20	6.05	5.05	4.25	2.43	4.85	2.75	2.54	1.86
28	1.71	3.75	4.28	4.10	5.35	6.90	4.90	2.43	3.95	3.70	2.43	1.80
29	1.71	4.00	8.20	4.65	4.95	6.65	4.93	2.55	3.65	3.87	2.33	2.03
30	1.72	3.62	9.30	4.55	.....	5.80	4.77	2.69	3.25	3.27	2.27	5.25
31	1.80	.....	6.60	4.80	.....	5.20	.....	2.87	.....	2.82	2.18	.....

GUYANDOT RIVER AT BRANCHLAND, W. VA.

LOCATION.—At highway bridge at Branchland, Lincoln County. Fourmile Creek enters river on the left about 20 feet above the bridge.

DRAINAGE AREA.—1,230 square miles (measured on map of West Virginia, scale 1:500,000).

RECORDS AVAILABLE.—July 8, 1915, to September 30, 1916.

GAGE.—Chain gage fastened to handrail on upstream side of bridge near center of main span; read by C. D. Moore.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of stream is composed of rock, gravel, sand, and mud; fairly permanent; character of control not determined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 23.9 feet at 5.20 p. m. December 18 (discharge, 20,900 second-feet); minimum stage, 2.82 feet November 8–10 and 11–15 (discharge, 201 second-feet).

Highest flood known reached a gage height of about 44 feet by present gage.

ICE.—Stage-discharge relation probably not affected by ice.

ACCURACY.—Stage-discharge relation changes during floods; not affected by ice during the year. Rating curve for 1915 fairly well defined between 600 and 25,000 second-feet; curve for 1916 is well defined between 280 and 25,000 second-feet; beyond these limits both curves are extensions. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. No gage readings reported and discharge interpolated December 1–3 and 5–10 and estimated from record of Tug River at Kermit, W. Va., January 17–22. No observer available after July 16. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Guyandot River at Branchland, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 7	B. J. Peterson	4.19	642
Dec. 11	Frosch and Conklin	3.60	304
11	.....do	3.60	310

Daily discharge, in second-feet, of Guyandot River at Branchland, W. Va., for the years ending Sept. 30, 1915 and 1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1915.				1915.			
1	.....	302	130	16	565	285	170
2	.....	255	130	17	610	270	182
3	.....	320	170	18	610	355	150
4	.....	435	225	19	765	285	122
5	.....	395	320	20	765	240	130
6	.....	270	375	21	1,800	195	195
7	.....	240	660	22	2,670	150	182
8	1,060	210	588	23	2,270	130	160
9	940	150	520	24	820	160	170
10	710	150	415	25	635	160	210
11	610	182	338	26	520	130	255
12	588	122	285	27	435	130	225
13	565	170	255	28	320	130	210
14	635	150	195	29	302	150	182
15	565	270	210	30	225	130	170
				31	270	130	.....

Daily discharge, in second-feet, of Guyandot River at Branchland, W. Va., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1915–16.										
1	2,980	95	620	4,260	7,030	2,720	2,810	1,820	470	620
2	7,660	95	590	3,150	11,900	2,300	2,060	1,520	445	244
3	2,980	98	560	2,720	7,340	5,280	1,820	1,310	445	395
4	1,460	90	530	2,380	4,850	7,980	1,740	1,820	500	280
5	1,030	80	500	2,060	4,340	5,020	1,380	1,310	590	252
6	770	72	470	2,300	4,080	4,170	1,170	1,100	590	204
7	650	64	440	2,640	5,820	5,280	1,030	1,380	770	168
8	500	64	410	4,340	5,280	10,600	1,590	1,240	1,590	153
9	420	64	380	5,100	4,850	7,760	4,340	1,170	1,820	126
10	370	64	350	4,940	5,100	4,420	4,080	1,030	1,520	102
11	320	64	320	7,870	5,730	3,150	4,260	890	1,380	100
12	280	88	345	11,600	4,000	2,300	7,240	830	1,520	100
13	248	120	395	12,500	3,660	1,590	6,500	710	890	100
14	220	280	470	8,920	3,580	1,460	4,260	650	710	100
15	186	2,380	560	5,460	3,060	1,310	2,720	620	620	100
16	179	4,680	650	4,760	2,640	1,240	2,300	560	530	212
17	156	3,580	5,100	3,500	2,470	1,170	1,380	500	620	.....
18	172	1,740	18,800	2,700	2,300	1,030	1,170	420	1,030	.....
19	232	1,100	18,800	1,800	1,980	1,030	960	345	2,060	.....
20	190	1,030	5,100	1,500	1,380	1,030	960	300	1,100	.....
21	208	1,030	3,920	1,500	1,240	1,170	890	300	770	.....
22	200	960	2,900	1,600	1,100	1,900	890	280	560	.....
23	172	890	2,470	4,850	1,240	3,920	890	280	445	.....
24	162	770	2,060	4,420	1,980	2,980	890	280	370	.....
25	156	710	1,520	3,580	2,640	2,140	890	280	345	.....
26	153	710	1,520	2,900	8,400	1,740	830	280	6,300	.....
27	138	650	1,660	1,980	5,730	4,170	1,030	268	4,000	.....
28	129	590	3,740	1,740	3,920	6,300	1,590	248	1,900	.....
29	120	650	6,720	1,590	3,150	7,240	3,150	248	960	.....
30	105	650	7,240	1,460	.....	5,640	2,380	370	710	.....
31	98	.....	6,920	3,580	.....	4,000	.....	470	.....	.....

Monthly discharge of Guyandot River at Branchland, W. Va., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 1,230 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
July 8–31	2,670	225	802	0.652	0.58
August	435	122	215	.175	.20
September	660	122	251	.204	.23
1915–16.					
October	7,660	98	730	.593	.68
November	4,680	64	782	.636	.71
December	18,800	.....	3,100	2.52	2.90
January	12,500	1,460	3,990	3.24	3.74
February	11,900	1,100	4,170	3.39	3.66
March	10,600	1,030	3,610	2.93	3.38
April	7,240	830	2,240	1.82	2.03
May	1,820	248	736	.598	.69
June	6,300	345	1,190	.967	1.08
July 1–16	620	100	204	.166	.10

MUD RIVER AT YATES, W. VA.

LOCATION.—About 200 feet above the highway bridge at Yates, Cabell County, 2 miles above Howell milldam, and 15 miles from Huntington.

DRAINAGE AREA.—318 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 19, 1915, to September 30, 1916.

GAGE.—Vertical and inclined staff on left bank; read by C. J. McDonie.

DISCHARGE MEASUREMENTS.—Made from single-span steel highway bridge below gage.

CHANNEL AND CONTROL.—One channel up to high stages, when right bank overflows around right abutment; straight for about 50 feet above and 75 feet below bridge. Primary control at ford about 100 feet below gage; probably fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.35 feet at 7.30 a. m. December 19 (discharge, 5,400 second-feet); minimum stage, 1.68 feet at 6 p. m. August 8 (discharge, 10 second-feet).

Highest flood known reached a gage height of about 23 feet by present gage.

ICE.—Stage-discharge relation probably not affected by ice.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during the year. Rating curve well defined between 14 and 5,500 second-feet; beyond these limits the curve is an extension. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Mud River at Yates, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	B. J. Peterson	3.92	288	Jan. 12	F. Conklin	14.05	4,250
Dec. 13	F. Conklin	2.51	58	Feb. 1	....do	10.32	2,470
13	A. E. Frosch	2.51	64				

Daily discharge, in second-feet, of Mud River at Yates, W. Va., for the years ending Sept. 30, 1915 and 1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1915.				1915.				1915.			
1	.....	19	21	11	.....	17	33	21	108	45	48
2	.....	21	19	12	.....	14	28	22	72	36	76
3	.....	100	47	13	.....	9	23	23	49	27	52
4	.....	71	54	14	.....	9	26	24	36	24	28
5	.....	68	468	15	.....	21	24	25	28	23	27
6	.....	50	327	16	.....	14	18	26	23	19	24
7	.....	34	196	17	.....	21	14	27	22	17	51
8	.....	28	89	18	.....	349	13	28	20	20	49
9	.....	22	58	19	26	138	15	29	21	30	31
10	.....	19	43	20	138	58	34	30	19	24	34
								31	18	20	.....

Daily discharge, in second-feet, of Mud River at Yates, W. Va., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	3,330	36	78	621	2,330	327	418	232	102	34	17	51
2	4,230	38	83	1,040	2,280	468	327	187	67	89	15	62
3	785	32	83	621	1,080	785	349	178	123	294	13	56
4	305	27	83	394	813	648	729	1,660	89	89	34	46
5	518	27	83	305	729	675	418	1,080	53	46	27	40
6	394	27	53	621	1,140	813	327	468	54	37	24	38
7	213	32	62	785	2,150	1,360	262	518	187	29	15	34
8	146	27	61	543	1,280	1,660	872	702	178	25	10	52
9	108	27	58	621	842	729	2,920	443	102	26	162	62
10	95	25	58	1,000	1,220	493	1,660	283	146	24	2,690	47
11	78	24	57	2,930	757	935	970	222	89	23	4,670	42
12	72	47	54	4,180	702	418	675	170	78	23	1,000	32
13	60	62	67	3,530	2,640	349	443	130	61	21	2,020	25
14	57	294	89	1,980	1,940	327	371	108	50	22	872	50
15	53	3,230	108	729	813	702	305	95	187	21	394	83
16	48	3,680	116	543	648	729	232	123	222	123	349	78
17	45	675	2,380	468	569	595	242	95	154	154	1,140	67
18	45	349	5,080	595	569	443	262	89	187	78	785	59
19	204	648	5,680	418	648	371	213	67	1,320	60	262	62
20	283	757	2,060	443	569	305	178	57	1,860	138	842	43
21	146	418	595	1,080	468	305	170	54	493	102	349	29
22	95	272	418	903	349	349	187	52	232	51	146	27
23	83	187	305	1,420	327	294	178	58	138	38	222	27
24	67	162	252	813	371	222	146	54	83	29	232	26
25	58	123	327	518	1,250	196	222	51	78	25	138	30
26	55	108	1,080	394	1,280	170	418	41	58	24	89	24
27	49	123	702	327	785	2,060	418	40	53	37	170	23
28	47	123	1,220	272	493	2,830	418	42	54	29	108	21
29	45	102	3,790	394	394	2,020	371	47	45	15	89	29
30	40	89	4,340	2,420	.....	872	294	54	39	23	72	18
31	44	.....	1,280	1,420	.....	543	.....	102	.....	16	57	.....

Monthly discharge of Mud River at Yates, W. Va., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 318 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
July 19-31	138	18	44.6	0.140	0.07
August	349	9	44.1	.139	.16
September	468	13	65.7	.207	.23
1915-16.					
October	4,230	40	382	1.20	1.38
November	3,680	24	392	1.23	1.37
December	5,680	53	990	3.11	3.58
January	4,280	272	1,050	3.30	3.80
February	2,640	327	1,020	3.21	3.46
March	2,830	170	742	2.33	2.69
April	2,930	146	500	1.57	1.75
May	1,660	40	242	.761	.88
June	1,860	39	219	.689	.77
July	294	15	56.3	.177	.20
August	4,670	10	549	1.73	1.99
September	83	18	42.8	.135	.15
The year	5,680	10	515	1.62	22.02

TWELVEPOLE CREEK BASIN.

TWELVEPOLE CREEK AT WAYNE, W. VA.

LOCATION.—At highway bridge about 500 feet above railroad bridge of East Lynne branch of Norfolk & Western Railway at Wayne, Wayne County, about three-fourths mile below junction of East and West forks.

DRAINAGE AREA.—291 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 1, 1915, to September 30, 1916.

GAGE.—Chain gage attached to upstream handrail about 90 feet from left abutment; read by Byron Smith.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Straight for about 80 feet above and 1,200 feet below bridge. Bed of stream composed of rock and sand. Principal control is Sampson's mill-dam; probably permanent, but at low stages the operation of the mill may affect the stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.95 feet at 5.30 p. m. December 18 (discharge, 7,140 second-feet); minimum stage, 1.48 feet at 6.30 p. m. August 8 (discharge, 11 second-feet).

Highest flood known reached a stage represented by gage height about 25 feet.

ICE.—Stage-discharge relation probably not materially affected by ice.

REGULATION.—None, except for backwater caused during low-water periods by operation of small power plant at Sampson's mill.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice; river reported frozen January 8, but comparison with other near-by streams indicates little, if any, effect; operation of power plant at dam about a mile below gage may have slight effect upon stage-discharge relation at low stages, but this effect, if any, is small, as the plant is only operated occasionally for a few hours at a time. Rating curve well defined between 139 and 6,700 second-feet; fairly well defined between 29 and 139 second-feet; beyond these limits the curve is an extension. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Twelvepole Creek at Wayne, W. Va., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 5	B. J. Peterson	4.17	358
Dec. 12	F. Conklin	2.42	53
12	A. E. Frosch	2.40	61

Daily discharge, in second-feet, of Twelvepole Creek at Wayne, W. Va., for the years ending Sept. 30, 1915 and 1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1915.				1915.				1915.			
1	495	66	20	11	182	38	15	21	139	31	10
2	190	47	20	12	131	37	14	22	116	24	9.4
3	265	131	19	13	108	47	13	23	63	26	9
4	285	469	17	14	80	38	14	24	47	18	10
5	44	148	15	15	65	76	15	25	42	16	10.8
6	59	74	17	16	53	74	12	26	33	16	9.6
7	35	50	31	17	50	53	9.8	27	30	22	12
8	1,780	51	26	18	44	56	9.8	28	28	18	12
9	573	38	22	19	42	41	9.8	29	34	20	13
10	245	33	16	20	42	35	11	30	31	28	15
								31	32	28	.....

Daily discharge, in second-feet, of Twelvepole Creek at Wayne, W. Va., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,320	18	12	628	2,060	443	521	226	48	22	16	25
2	1,480	20	14	573	1,280	418	521	255	38	19	14	108
3	1,400	23	79	443	875	842	495	217	44	17	12	86
4	1,360	26	63	285	686	573	394	547	52	15	12	81
5	306	19	69	285	628	600	327	573	66	14	10	70
6	199	27	69	547	1,280	573	327	469	55	15	10	60
7	148	20	65	547	1,700	1,650	285	1,130	60	13	9	48
8	123	17	61	495	979	1,130	875	809	79	12	9	33
9	69	21	57	521	909	746	1,520	418	131	14	75	27
10	56	17	56	1,090	1,170	573	1,050	327	139	26	101	24
11	52	19	54	2,870	746	418	657	265	94	34	87	21
12	46	35	60	2,920	600	371	600	226	76	23	61	18
13	38	46	73	3,370	716	306	521	190	64	20	173	17
14	45	52	94	1,400	875	306	418	164	76	18	94	15
15	41	3,070	101	746	657	349	349	139	69	19	123	108
16	31	909	208	495	686	327	306	123	75	20	1,050	79
17	28	394	2,320	394	777	327	285	94	73	22	1,020	64
18	23	469	6,420	255	443	306	265	74	86	31	349	51
19	28	547	2,820	349	394	285	236	63	1,650	56	208	35
20	31	371	777	443	327	245	208	56	469	38	306	32
21	30	285	495	547	285	394	217	55	255	24	156	27
22	28	164	349	657	245	394	217	53	148	18	94	24
23	28	139	306	686	236	418	217	58	84	18	116	21
24	34	123	265	657	327	371	199	60	68	17	101	18
25	38	88	469	521	1,200	285	208	51	56	17	64	17
26	40	81	528	418	1,130	265	285	36	52	20	53	16
27	28	81	600	327	777	3,270	394	31	45	25	44	14
28	26	13	1,200	285	521	2,920	394	35	33	18	62	13
29	26	18	3,070	418	521	2,280	371	48	28	18	42	14
30	24	15	2,680	1,020	.....	1,170	208	60	26	17	28	15
31	21	.....	875	716	.....	686	.....	56	.....	16	24	.....

Monthly discharge of Twelvepole River at Wayne, W. Va., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 291 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
July	1,780	28	173	0.595	0.69
August	469	16	59.6	.205	.24
September	31	9	14.5	.050	.06
1915-16.					
October	2,320	21	263	0.904	1.04
November	3,070	13	238	.818	.91
December	6,420	12	787	2.70	3.11
January	3,370	255	803	2.76	3.18
February	2,060	236	794	2.73	2.94
March	3,270	245	750	2.58	2.97
April	1,520	199	429	1.47	1.64
May	1,130	31	223	.766	.88
June	1,650	26	141	.485	.54
July	56	12	21.2	.073	.08
August	1,050	9.4	146	.502	.58
September	108	13	39.5	.136	.15
The year	6,420	9.4	386	1.33	18.02

BIG SANDY RIVER BASIN.

LEVISA RIVER AT THELMA, KY.

LOCATION.—At Chesapeake & Ohio Railway bridge at Thelma, Johnson County, 2 miles below Paintsville. Buffalo Creek enters on right about half a mile above the station.

DRAINAGE AREA.—2,090 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—June 1, 1915, to September 30, 1916.

GAGE.—Vertical staff gage attached to right shore pier of bridge, portion of gage above 24 feet is cut in masonry steps on upper end of right abutment; read by John Stambaugh. Sea-level elevation of gage, 561.82 feet (United States Engineer Corps).

DISCHARGE MEASUREMENTS.—Made from boardwalk constructed on the lower chord of the bridge on the downstream side of bridge.

CHANNEL AND CONTROL.—Channel straight one-half mile above and 300 feet below gage. Bed of stream sandy, remains of cofferdams around piers and piles at measuring section. Primary control about 2,400 feet downstream composed of rock which extends three-fourths of the way across stream, remainder is firm sand, probably permanent.

FLOODS.—Highest stage recorded, 42.6 feet by present gage.

ICE.—Stage-discharge relation probably not affected by ice.

REGULATION.—Splash dams on tributaries and in main stream about 50 miles above used by timber companies may affect flow to some extent.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during the year. Rating curve well defined between 1,500 and 41,000 second-feet; beyond these limits, curve is an extension. Gage read twice daily to hundredths below 10 feet and to tenths above 10 feet. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Levisa River at Thelma, Ky., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 30	F. C. Sammons	23.95	31,800	Jan. 13	Frye and Sammons	17.10	18,600
30	do	23.35	30,700	29	do	5.70	3,030
30	do	22.90	29,200	Feb. 1	do	9.10	7,050
31	Frye and Sammons	16.0	14,800	Mar. 8	do	14.15	13,900
31	do	14.35	12,700	8	do	15.15	15,000
Jan. 4	do	9.35	6,390	9	do	14.05	13,000
5	do	8.20	4,930	9	do	13.15	11,500
5	do	7.95	4,860	9	do	12.55	10,600
6	do	7.4	4,400	22	do	5.2	2,050
6	do	7.4	4,310	Apr. 10	H. E. Frye	13.20	12,100
10	do	10.95	8,780	10	do	12.95	11,600
10	do	10.95	8,950	11	do	11.33	9,160
12	do	16.35	17,400	11	do	10.85	8,720
12	do	16.10	16,300	25	do	4.20	1,530

Daily discharge, in second-feet, of Levisa River at Thelma, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					1915.				
1	3,740	700	645	930	16	3,200	1,900	620	238
2	4,320	1,900	410	700	17	2,480	1,400	755	175
3	4,520	1,190	310	570	18	2,220	1,260	3,560	150
4	3,200	1,260	810	495	19	1,610	1,060	2,840	310
5	2,220	2,400	672	495	20	1,260	995	1,980	272
6	2,400	1,820	545	595	21	995	2,060	1,120	495
7	1,120	1,120	430	755	22	755	3,110	810	645
8	930	1,980	350	995	23	620	3,020	570	520
9	1,120	1,540	290	810	24	495	1,750	520	450
10	870	870	272	755	25	390	1,190	430	495
11	995	995	350	520	26	350	870	290	390
12	1,060	1,680	570	472	27	310	672	205	350
13	995	3,830	570	370	28	272	472	272	290
14	995	5,140	520	350	29	238	410	1,060	255
15	1,610	3,380	672	290	30	370	310	2,480	255
					31	.....	272	1,610	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	7,720	220	1,120	7,850	5,800	4,120	7,720	2,750	620	472	310	330
2	14,000	205	1,120	5,690	12,800	4,920	5,360	2,220	645	390	272	410
3	6,240	190	995	5,030	11,500	7,980	4,320	1,980	700	310	310	450
4	3,200	190	755	6,480	7,460	12,400	3,470	2,140	570	272	255	350
5	2,840	190	755	4,920	7,080	9,250	2,930	1,470	472	255	220	290
6	2,480	160	755	4,320	7,200	6,960	2,400	1,680	472	220	272	255
7	1,680	160	700	4,920	10,000	8,260	2,140	1,540	870	205	1,120	255
8	1,330	160	570	16,300	10,000	12,700	3,380	1,400	810	190	595	255
9	672	160	545	12,200	8,540	11,800	10,800	1,260	1,470	190	672	290
10	570	160	545	8,820	9,550	7,720	11,800	1,120	1,260	187	700	255
11	700	160	545	10,000	10,000	5,470	8,540	995	1,120	184	870	205
12	620	160	545	16,000	7,850	3,650	7,460	870	930	190	1,980	175
13	545	190	810	17,400	5,910	3,110	6,480	810	810	190	2,660	160
14	495	190	1,120	12,700	4,720	2,570	5,030	700	672	220	2,060	163
15	450	7,720	1,900	9,700	3,380	2,570	3,920	672	620	255	3,470	290
16	410	9,250	2,930	6,600	2,140	2,400	3,020	620	595	255	24,400	272
17	370	5,910	37,300	5,140	2,570	2,310	2,480	595	755	290	15,800	450
18	390	2,660	43,300	3,740	2,660	1,980	2,140	545	620	870	6,240	450
19	430	2,480	44,700	3,020	2,310	2,140	1,820	495	1,330	1,330	3,380	390
20	620	2,660	17,200	2,480	2,140	2,140	1,400	472	995	2,140	2,570	310
21	430	3,380	7,200	2,480	1,900	2,140	1,260	450	755	3,380	1,680	255
22	430	2,660	4,620	2,840	1,680	2,140	1,540	430	595	2,140	1,190	220
23	450	2,220	3,560	5,910	1,610	2,310	1,400	430	472	1,900	930	205
24	450	1,540	2,480	9,700	1,680	2,220	1,260	430	472	2,660	755	190
25	390	1,260	2,310	6,960	5,360	1,980	1,470	450	472	1,120	755	154
26	370	1,190	4,720	5,140	13,600	1,820	1,540	472	1,400	755	870	140
27	350	1,980	4,520	3,740	9,400	3,290	1,900	495	1,900	545	700	130
28	330	1,260	5,360	3,110	6,720	21,800	2,750	520	1,260	450	570	130
29	350	1,190	17,700	2,750	4,920	31,400	3,560	390	810	450	472	163
30	255	1,120	30,300	2,930	.....	18,100	3,200	570	595	450	410	166
31	255	.....	14,300	2,660	.....	10,600	.....	545	.....	390	370	.....

Monthly discharge of Levisa River at Thelma, Ky., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 2,090 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
June	4,520	238	1,520	0.727	0.81
July	5,140	272	1,630	.780	.90
August	3,560	205	856	.409	.47
September	995	150	480	.229	.26
1915–16.					
October	14,000	255	1,610	.770	.89
November	9,250	160	1,700	.813	.91
December	44,700	545	8,230	3.94	4.54
January	17,400	2,480	6,820	3.26	3.76
February	13,600	1,610	6,220	2.98	3.21
March	31,400	1,820	6,850	3.28	3.78
April	11,800	1,260	3,880	1.86	2.08
May	2,750	390	952	.456	.53
June	1,900	472	836	.400	.45
July	3,380	184	737	.353	.41
August	24,400	220	2,480	1.19	1.37
September	450	130	259	.124	.14
The year	44,700	130	3,380	1.62	22.07

TUG FORK AT KERMIT, W. VA.

LOCATION.—About 150 feet above United Fuel Gas Co.'s ferry at Kermit, Mingo County. Marrowbone Creek enters on right about 2 miles below the gage.

DRAINAGE AREA.—1,240 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—June 1, 1915, to September 30, 1916.

GAGE.—Vertical staff gage in three sections attached to trees on right bank of river; 0–20 feet 160 feet above cable, 20–38 feet 130 feet below cable, and 38–48 feet at cable; read by C. C. Preece. Sea-level elevation of zero of gage, 574.77 feet (United States Engineer Corps).

DISCHARGE MEASUREMENTS.—Made from standard car on ferry cable or by wading under cable.

CHANNEL AND CONTROL.—Channel straight above and below, bed of stream sandy; control about 150 feet below cable composed of solid rock which extends half way across from left bank and loose rock placed in river for fording, probably permanent.

FLOODS.—Highest stage recorded 46.7 feet according to present gage.

ICE.—Stage-discharge relation rarely if ever affected by ice.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during year. Rating curve well defined between 85 and 25,000 second-feet; beyond these limits the curve is an extension. Gage read twice daily to hundredths below 10 feet and to tenths above 10 feet. Daily discharge ascertained by applying mean daily gage heights to rating table. Daily discharge September 5–19, 1915, estimated from flow of Levisa River at Thelma and Guyandot River at Branchland. Results excellent.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Tug Fork at Kermit, W. Va., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1916.		*Feet.*	*Sec.-ft.*
May 22	H. E. Frye	2.0	181	Feb. 2	F. C. Sammons	12.95	9,390
June 16	F. C. Sammons	4.95	1,530	2	do	12.55	8,470
				3	do	10.95	6,410
1915–16.				4	do	9.1	4,520
Oct. 30	do	1.7	98.3	Mar. 7	do	10.1	5,730
Nov. 16	do	7.45	3,320	8	do	14.1	11,300
Dec. 18	do	21.75	21,300	8	do	14.6	11,300
19	do	17.00	14,400	8	do	14.45	11,200
Jan. 8	do	14.9	12,100	9	do	11.45	7,140
9	do	10.95	6,790	9	do	10.95	6,580
9	do	10.55	6,210	9	do	10.35	5,790
9	do	10.15	5,800	10	do	8.85	4,260
10	do	8.9	4,570	17	Frye and Sammons	4.61	1,200
11	do	9.45	5,120	18	do	4.51	1,180
12	do	13.7	10,600	Apr. 26	do	4.38	1,070
12	do	13.5	9,660	27	do	5.06	1,490
12	do	12.9	8,910	June 26	F. C. Sammons	8.65	4,520
12	do	12.4	8,410	27	do	6.52	2,580
13	do	12.3	8,150	27	do	6.23	2,400
13	do	11.9	7,690	27	do	5.78	2,000
30	do	5.15	1,610	27	do	5.48	1,810
Feb. 1	do	12.0	8,360	28	do	4.65	1,290

Daily discharge, in second-feet, of Tug Fork at Kermit, W. Va., for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					1915.				
1	1,820	118	132	165	16	1,610	290	365	.....
2	2,280	220	118	148	17	1,100	232	185	.....
3	1,900	305	118	140	18	685	208	365	.....
4	1,340	1,160	195	148	19	470	175	400	.....
5	935	990	350	.....	20	350	490	260	232
6	640	730	290	.....	21	365	1,220	220	320
7	452	685	175	.....	22	290	1,340	185	350
8	435	550	132	.....	23	208	780	148	208
9	640	452	110	.....	24	165	470	118	165
10	470	382	110	.....	25	140	335	102	165
11	335	572	102	.....	26	132	260	90	195
12	572	435	132	.....	27	118	232	85	118
13	595	435	185	.....	28	102	185	118	132
14	418	350	195	.....	29	95	148	245	155
15	1,400	400	320	.....	30	102	148	220	155
					31	.....	148	220	.....

Daily discharge, in second-feet, of Tug Fork at Kermit, W. Va., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	2,200	95	418	3,980	6,530	2,040	3,720	1,900	640	382	320	195
2	3,560	95	382	3,640	8,740	3,080	2,840	1,610	435	305	305	195
3	1,680	85	365	3,560	6,310	6,750	2,360	1,340	418	275	260	195
4	935	85	335	3,000	4,900	8,140	1,900	1,220	990	245	572	350
5	685	85	335	2,360	4,160	5,400	1,610	1,100	780	208	400	290
6	550	85	305	2,360	4,250	4,340	1,340	935	572	185	595	320
7	435	85	305	3,320	6,530	5,100	1,220	830	935	165	1,470	148
8	350	75	275	10,300	6,100	10,600	2,200	830	2,200	260	935	140
9	290	75	245	6,310	5,100	6,860	5,100	780	1,470	418	1,100	140
10	245	75	245	4,700	5,500	4,340	5,700	685	990	185	1,040	125
11	220	75	245	5,200	5,400	3,080	5,500	595	880	148	990	125
12	185	85	290	10,300	4,160	2,200	6,100	550	730	140	1,160	125
13	175	118	365	7,900	3,320	1,820	4,700	490	550	148	1,340	110
14	155	118	4,520	6,750	2,520	1,680	3,480	572	418	140	2,600	110
15	140	2,920	780	4,900	1,900	1,610	2,680	400	365	155	2,360	452
16	125	3,080	1,100	3,480	1,750	1,340	2,040	382	305	320	8,620	275
17	125	1,470	11,500	2,680	1,610	1,220	1,680	365	435	685	6,000	780
18	125	880	20,600	1,750	1,470	1,220	1,400	335	595	1,900	3,240	418
19	125	780	12,800	1,470	1,340	1,220	1,220	305	572	1,220	1,970	275
20	155	880	5,500	1,470	1,280	1,220	1,040	275	510	1,820	990	220
21	155	880	3,160	1,470	1,160	1,340	935	245	400	1,750	1,100	175
22	155	730	2,120	1,610	1,160	1,540	1,040	232	320	1,610	780	155
23	140	685	1,750	3,890	1,220	1,900	990	275	275	3,480	595	155
24	125	550	1,280	4,700	1,470	1,900	990	275	260	1,750	510	140
25	125	452	1,040	3,640	6,200	1,470	880	320	452	1,220	418	125
26	110	400	1,680	2,680	9,340	1,340	990	335	2,920	780	365	118
27	110	400	1,820	1,820	5,800	3,640	1,610	260	2,360	572	320	110
28	110	365	2,520	1,750	4,070	7,190	2,680	220	1,160	470	290	118
29	102	418	11,600	1,470	3,320	9,340	2,680	245	730	685	260	140
30	95	435	13,500	1,540	.....	7,420	2,360	320	490	572	232	165
31	95	.....	6,100	1,610	.....	5,100	.....	452	.....	418	208	.....

Monthly discharge of Tug Fork at Kermit, W. Va., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 1,240 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
June	2,280	95	672	0.542	0.60
July	1,340	118	466	.376	.43
August	400	85	193	.156	.18
September	.....	.....	216	.174	.19
1915–16.					
October	3,560	95	445	.359	.41
November	3,080	75	552	.445	.50
December	20,600	245	3,470	2.80	3.23
January	10,300	1,470	3,730	3.01	3.47
February	9,340	1,160	4,020	3.24	3.49
March	10,600	1,220	3,720	3.00	3.46
April	6,100	880	2,430	1.96	2.19
May	1,900	220	603	.486	.56
June	2,920	260	805	.649	.72
July	3,480	140	729	.588	.68
August	8,620	208	1,330	1.07	1.23
September	780	110	213	.172	.19
The year	20,600	75	1,840	1.48	20.13

BLAINE CREEK AT YATESVILLE, KY.

LOCATION.—At covered highway bridge one-fourth mile above Yatesville, Lawrence County, Morgan Branch enters on left about 2 miles above station.

DRAINAGE AREA.—216 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—June 1, 1915, to September 30, 1916.

GAGE.—Vertical staff gage in two sections attached to elm tree on right bank about 50 feet above bridge. Read by Hattie M. Carter.

DISCHARGE MEASUREMENTS.—Made from lower side of bridge; board walk constructed on inside of bridge near top of siding of bridge for use in making measurements. Wading measurements are made under bridge.

CHANNEL AND CONTROL.—Stream curved above and straight below bridge, right bank overflows at high stages, stream-bed compact sand and gravel; control composed of bed rock extending half way across stream, sand and gravel rest of way, probably permanent.

FLOODS.—Highest stage recorded, 27.1 feet according to present gage.

ICE.—Stage-discharge relation rarely affected by ice.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during the year. Rating curve well defined between 20 and 4,000 second-feet; beyond these limits curve is an extension. Gage read twice daily to hundredths below and tenths above 10 feet. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Blaine Creek at Yatesville, Ky., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915–16.		*Feet.*	*Sec.-ft.*	1915–16.		*Feet.*	*Sec.-ft.*
June 12	F. C. Sammons	6.4	1,620	Feb. 25	Frye and Sammons	5.7	1,330
12	do	5.7	1,310	25	do	5.57	1,300
July 2	do	4.6	885	May 4	do	6.90	1,870
8	do	9.8	3,310	June 6	F. C. Sammons	1.39	33.
8	do	11.2	4,150	17	do	2.74	240
Nov. 23	Loeb and Sammons	2.52	267	17	do	3.01	329
Dec. 29	F. C. Sammons	11.45	4,350	19	do	9.61	3,280
29	do	12.05	4,730	19	do	10.80	3,570
Jan. 28	Frye and Sammons	2.6	246	19	do	11.05	3,830
28	do	2.6	266	19	do	11.13	3,780
28	do	2.6	247				

Daily discharge, in second-feet, of Blaine Creek at Yatesville, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					1915.				
1	132	375	132	38	16	123	105	73	19
2	160	800	80	30	17	88	80	43	15
3	435	331	123	27	18	60	54	405	15
4	290	264	290	21	19	54	54	114	12
5	123	239	345	30	20	38	73	80	19
6	88	204	105	105	21	34	405	80	21
7	54	141	73	88	22	38	132	105	30
8	192	2,820	54	60	23	24	80	60	24
9	96	1,440	43	43	24	19	54	43	17
10	48	495	34	54	25	17	48	43	15
11	38	695	21	54	26	15	38	38	13
12	1,440	360	170	30	27	13	27	30	13
13	304	264	123	27	28	13	38	30	17
14	204	215	66	21	29	17	48	48	13
15	114	141	150	21	30	30	60	123	13
					31	.....	405	66	.....

Daily discharge, in second-feet, of Blaine Creek at Yatesville, Ky., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	3,220	43	204	525	2,020	590	465	170	91	34	13	32
2	1,040	34	160	555	1,040	405	405	150	54	30	12	54
3	405	34	150	495	660	405	345	150	43	27	10	132
4	252	34	132	360	525	360	304	1,360	41	21	12	88
5	405	30	123	317	465	405	264	590	38	21	17	45
6	435	27	114	405	590	405	215	375	34	20	14	36
7	215	27	96	465	695	1,120	170	660	56	17	44	32
8	141	27	80	465	465	880	525	555	61	16	43	48
9	105	24	66	405	495	465	1,530	317	41	17	83	56
10	88	27	66	800	590	495	765	252	43	19	60	45
11	73	24	66	2,520	465	317	525	204	100	17	48	38
12	60	30	80	3,120	405	252	405	181	80	17	625	28
13	54	80	105	4,530	1,040	215	331	132	45	15	800	25
14	43	80	123	1,200	800	227	277	114	35	15	204	22
15	38	3,420	105	590	525	227	239	103	123	15	141	36
16	27	1,200	204	495	465	252	215	86	264	17	2,430	65
17	34	405	3,720	375	405	264	204	80	252	48	1,120	35
18	48	277	6,290	331	375	252	160	69	170	67	360	25
19	1,120	1,120	3,520	660	317	239	150	56	2,670	36	123	21
20	495	765	800	405	290	215	141	48	960	96	525	19
21	317	405	590	317	239	317	132	44	435	239	227	19
22	239	290	435	465	227	317	141	42	252	73	181	18
23	150	227	331	730	227	239	114	48	170	48	150	18
24	123	181	277	465	360	204	114	54	123	27	160	17
25	96	141	290	360	1,200	192	123	41	105	22	109	15
26	80	123	730	304	660	170	132	36	88	21	76	15
27	66	465	525	264	465	1,760	264	38	60	18	252	13
28	60	360	800	239	317	3,120	227	40	54	22	83	13
29	54	304	3,720	345	331	3,920	227	36	43	16	69	17
30	48	227	1,710	960	.....	1,040	192	181	41	15	56	23
31	43	.....	730	590	.....	660	.....	204	.....	13	43	.....

Monthly discharge of Blaine Creek at Yatesville, Ky., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 216 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
June	1,440	13	143	0.662	0.74
July	2,820	27	338	1.56	1.80
August	405	21	103	.477	.55
September	105	12	30.2	.140	.16
October	3,220	27	309	1.43	1.65
November	3,420	24	348	1.61	1.80
December	6,290	66	850	3.94	4.54
January	4,530	239	776	3.59	4.14
February	2,020	227	574	2.66	2.87
March	3,920	170	643	2.98	3.44
April	1,530	114	310	1.44	1.61
May	1,360	36	207	.958	1.10
June	2,670	34	219	1.01	1.13
July	239	13	34.8	.161	.19
August	2,430	10	261	1.21	1.40
September	132	13	35.0	.162	.18
The year	6,290	10	381	1.76	24.05

SCIOTO RIVER BASIN.

SCIOTO RIVER AT WAVERLY, OHIO.

LOCATION.—At the Norfolk & Western Railway bridge about 1 mile southeast of Waverly, Pike County.

DRAINAGE AREA.—5,730 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—March 23 to September 30, 1916.

GAGE.—Chain gage fastened to downstream side of bridge; read by W. G. Johnston. Sea-level elevation of zero of gage, 542.00 feet (United States Engineer Corps).

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge to which gage is attached, or from highway bridge, 2,000 feet below gage.

CHANNEL AND CONTROL.—For stages over 12 feet the river spreads over the bottom lands, but all water passes under the bridge.

EXTREMES OF DISCHARGE.—Maximum mean daily stage during period of records, 21.9 feet March 29 (discharge, 97,800 second-feet); minimum mean daily stage, 1.36 feet September 23 to 27 (discharge, 427 second-feet).

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined above 400 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. August 4, 5, September 2 and 16 no gage reading reported and discharge interpolated. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Scioto River at Waverly, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 23	Crosley and Baker	12.11	25,500	Apr. 6	Baker	6.52	8,320
24	do	15.54	35,400	May 11	do	7.48	10,900
28	Baker and Shepard	18.67	58,800	11	do	7.14	9,810
28	do	19.1	61,000	12	do	6.21	8,140
29	do	22.02	103,000	13	do	5.45	6,080
29	do	22.26	102,000	13	do	5.36	5,270
30	do	20.84	80,800	15	do	4.82	4,320
30	do	20.38	72,100	16	do	4.58	4,220
31	do	17.32	43,900	17	do	4.40	3,380
31	do	16.30	38,800	July 20	do	3.38	2,520
Apr. 1	Baker	12.69	23,200	20	do	3.35	2,260
1	do	12.42	19,800	25	do	2.69	1,420
1	do	11.60	22,000	25	do	2.68	1,620
4	do	8.02	12,200	Aug. 3	do	2.07	644
5	do	7.40	11,100	3	do	2.07	723
5	do	7.29	10,400				

Daily discharge, in second-feet, of Scioto River at Waverly, Ohio, for the year ending Sept. 30, 1916.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	25,300	6,240	5,760	2,300	770	620
2	.....	15,600	5,280	4,500	2,170	690	590
3	.....	14,100	4,320	7,720	1,900	690	560
4	.....	12,100	4,500	9,180	1,760	823	520
5	.....	9,680	4,500	9,430	1,630	957	520
6	.....	8,700	4,320	6,740	1,630	1,090	520
7	.....	7,720	10,700	7,960	1,500	860	1,090
8	.....	6,240	27,900	12,400	1,090	970	970
9	.....	7,960	29,300	14,100	1,090	2,980	690
10	.....	9,920	15,100	10,700	1,220	1,090	560
11	.....	9,680	10,400	10,400	1,090	1,090	520
12	.....	9,430	7,720	11,100	1,090	970	482
13	.....	8,700	6,240	8,940	970	970	482
14	.....	7,720	5,060	6,000	1,090	970	454
15	.....	6,490	4,500	4,500	970	860	427
16	.....	5,520	3,960	3,800	860	770	427
17	.....	5,060	3,800	3,250	860	620	427
18	.....	4,860	3,520	3,380	2,980	690	427
19	.....	4,860	3,250	3,660	5,760	620	427
20	.....	4,320	2,980	3,800	2,300	560	427
21	.....	3,960	2,980	5,520	2,040	520	427
22	.....	4,140	2,710	9,180	1,360	560	427
23	23,700	4,320	2,710	7,470	1,220	560	427
24	35,200	4,500	2,980	5,520	1,360	560	427
25	39,600	3,806	2,980	4,680	1,360	520	427
26	23,700	3,960	2,710	4,320	1,220	482	427
27	15,800	5,760	3,800	3,250	1,090	520	427
28	57,600	8,700	3,800	2,840	970	620	454
29	97,800	10,200	3,800	2,440	970	690	454
30	75,800	8,940	7,220	2,300	860	770	427
31	41,300	.....	8,700	.....	770	690	.....

Monthly discharge of Scioto River at Waverly, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 5,730 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
March 23–31	97,800	15,800	45,600	7.96	2.66
April	25,300	3,800	8,070	1.41	1.57
May	29,300	2,710	6,710	1.17	1.35
June	14,100	2,300	6,490	1.13	1.26
July	5,760	770	1,530	.267	.31
August	2,980	482	824	.144	.17
September	1,090	427	515	.090	.10
The period March 23 to Sept. 30	97,800	427	5,960	1.04	7.42

LITTLE MIAMI RIVER BASIN.

LITTLE MIAMI RIVER AT MIAMIVILLE, OHIO.

LOCATION.—At two-span steel highway bridge about one-third mile southeast of Miamiville, Clermont County.

DRAINAGE AREA.—1,200 square miles. (United States Engineer Corps.)

RECORDS AVAILABLE.—June 21, 1915, to September 30, 1916.

GAGE.—Chain gage attached to downstream side of bridge; read by Arnold Barrere.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge except at low stages, when they are made by wading.

CHANNEL AND CONTROL.—Channel clean of vegetation except at high stages. Control probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 13.97 feet January 13, 1916 (discharge, 27,000 second-feet); minimum stage, 1.35 feet September 24, 1916 (discharge, 72 second-feet).

REGULATION.—Low-water flow regulated to some extent by operation of flour mill at Fosters Crossing, about 11 miles upstream.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during year. Rating curve well defined between 100 and 6,000 second-feet, and fairly well defined between 6,000 and 20,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Results subject to error because of artificial regulation of flow.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Little Miami River at Miamiville, Ohio, during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914–15.		*Feet.*	*Sec.-ft.*	1915–16.		*Feet.*	*Sec.-ft.*
June 16	H. R. Daubenspeck....	4.0	1,650	Nov. 19	H. R. Daubenspeck....	5.77	4,540
21	Crosley and Daubenspeck.....	2.75	520	Dec. 21	L. M. Crosley.....	3.70	1,290
				Jan. 12	.....do.....	10.87	19,100
29	.....do.....	2.22	298	12	.....do.....	10.47	17,600
Sept. 2	H. R. Daubenspeck....	2.44	396	12	.....do.....	10.17	16,800
				June 7	A. C. Shepard.....	5.46	4,670
				7	.....do.....	4.96	4,200
				Sept. 20	L. M. Crosley.....	1.65	125

Daily discharge, in second-feet, of Little Miami River at Miamiville, Ohio, for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					1915.				
1.....	.....	650	722	335	16.....	.....	477	920	392
2.....	.....	1,650	412	353	17.....	.....	526	840	412
3.....	.....	1,190	500	317	18.....	.....	433	1,050	392
4.....	.....	685	584	300	19.....	.....	392	526	1,300
5.....	.....	5,630	392	5,630	20.....	.....	650	552	1,190
6.....	.....	1,360	282	4,590	21.....	.....	454	2,870	1,100
7.....	.....	800	247	4,330	22.....	433	392	2,870	526
8.....	.....	6,410	392	6,410	23.....	372	372	2,870	454
9.....	.....	3,550	1,470	1,780	24.....	335	335	1,650	412
10.....	.....	1,300	454	3,310	25.....	282	353	3,310	372
11.....	.....	920	353	1,140	26.....	247	282	840	300
12.....	.....	800	6,670	962	27.....	200	247	615	1,930
13.....	.....	552	2,100	760	28.....	353	282	477	1,930
14.....	.....	552	2,280	552	29.....	317	840	433	1,140
15.....	.....	800	1,930	454	30.....	840	615	477	760
					31.....	.....	454	392	.....

Daily discharge, in second-feet, of Little Miami River at Miamiville, Ohio, for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,470	317	454	9,530	9,270	880	2,100	722	1,470	1,140	156	140
2	2,100	335	412	10,300	3,310	800	1,780	650	840	615	132	114
3	1,300	317	412	5,890	2,100	722	1,780	880	5,890	353	118	108
4	800	300	433	2,670	1,470	650	2,280	1,470	7,450	317	142	148
5	6,930	282	433	2,100	1,300	650	1,650	920	2,100	247	282	125
6	2,470	300	392	2,100	1,100	760	1,360	722	3,090	230	215	500
7	1,470	335	372	1,530	1,100	12,100	1,050	5,890	4,590	215	760	1,650
8	1,300	317	372	1,190	880	4,330	1,000	4,850	2,670	200	584	552
9	615	282	372	1,000	920	2,280	1,360	1,930	1,650	200	840	650
10	650	265	353	1,300	1,000	1,780	2,100	1,360	1,100	215	335	265
11	650	300	353	10,300	1,050	1,530	1,780	1,050	800	200	247	282
12	552	300	372	17,600	7,190	1,240	1,410	880	1,100	200	335	215
13	526	282	392	22,300	7,190	1,100	1,190	760	800	215	335	200
14	526	317	392	8,490	3,550	1,000	1,050	685	685	247	335	158
15	500	335	353	2,470	1,780	1,140	880	615	650	265	265	148
16	454	335	372	1,650	1,530	1,000	840	552	615	247	189	145
17	433	335	18,900	1,300	1,930	920	840	500	650	247	175	118
18	454	4,590	9,270	1,100	4,330	840	685	477	685	215	153	86
19	526	2,470	3,810	1,100	2,280	920	615	433	685	920	153	128
20	477	1,050	1,780	1,410	2,670	1,240	615	372	685	962	140	100
21	477	840	1,360	5,370	1,930	1,300	1,100	392	2,100	454	130	116
22	392	840	1,050	10,300	1,650	4,850	920	650	2,100	353	140	118
23	433	615	962	5,890	2,100	4,850	685	1,360	1,530	317	125	108
24	412	552	880	2,870	2,870	3,310	615	920	840	372	122	78
25	353	500	4,590	2,280	3,810	2,670	615	552	685	247	120	164
26	372	477	2,670	1,780	2,670	4,590	760	477	500	172	116	135
27	372	433	1,780	1,650	1,470	22,300	1,100	412	477	197	135	84
28	353	454	4,330	2,280	1,000	11,100	1,100	392	412	194	200	122
29	353	433	16,600	11,100	920	7,190	800	800	392	161	142	132
30	335	722	9,270	16,000	.....	3,550	840	3,550	526	142	175	192
31	335	.....	5,630	13,700	.....	2,670	.....	2,670	.....	132	112	.....

Monthly discharge of Little Miami River at Miamiville, Ohio, for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 1,200 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
June (22-30)	840	200	375	0.312	0.10
July	6,410	247	1,100	.917	1.06
August	6,670	247	1,270	1.06	1.22
September	6,410	300	1,460	1.22	1.36
The year	6,670	200	1,190	.992	3.74
1915-16.					
October	6,930	335	948	.790	.91
November	4,590	265	641	.534	.60
December	18,900	353	2,870	2.39	2.76
January	22,300	1,000	5,760	4.80	5.53
February	9,270	880	2,560	2.13	2.30
March	22,300	650	3,360	2.80	3.23
April	2,280	615	1,160	.967	1.08
May	5,890	372	1,220	1.02	1.18
June	7,450	392	1,590	1.32	1.47
July	1,140	132	329	.274	.32
August	840	112	239	.199	.23
September	1,650	78	236	.197	.22
The year	22,300	78	1,750	1.46	19.83

EAST FORK OF LITTLE MIAMI RIVER AT PERINTOWN, OHIO.

LOCATION.—At single-span steel highway bridge at Perintown, Clermont County, about 5 miles above junction of East Fork and Little Miami Rivers.

DRAINAGE AREA.—459 square miles.

RECORDS AVAILABLE.—May 7, 1915, to September 30, 1916.

GAGE.—Chain gage attached to downstream side of bridge; read by G. W. Taylor.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge, except at low stages, when they are made by wading.

CHANNEL AND CONTROL.—Bed of river mostly rock; banks covered with trees and brush above a stage of about 5 feet; control rock and gravel and is probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 17.3 feet, December 17, 1915 (discharge, about 18,900 second-feet); minimum stage, 0.01 foot, August 3 and 4, 1916 (discharge, about 10 second-feet).

ICE.—Stage-discharge relation affected by ice in very severe winters.

ACCURACY.—Stage-discharge relation permanent; not affected by ice during year. Rating curve well defined between 10 and 7,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Results may be subject to error because of errors in mean daily gage heights owing to rapid fluctuations in stage.

COOPERATION.—Gage-height record, results of discharge measurements, and data for station description, furnished by United States Engineer Corps.

Discharge measurements of East Fork of Little Miami River at Perintown, Ohio, during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914–15.		*Feet.*	*Sec.-ft.*	1915–16.		*Feet.*	*Sec.-ft.*
May 10	L. M. Crosley	0.58	40	Oct. 1	H. R. Daubenspeck	8.97	5,020
26	Crosley and Daubenspeck	9.46	5,850	1	do	7.77	3,920
27	do	2.46	478	Nov. 4	do	.47	26
27	do	2.40	455	Jan. 22	Crosley and Shepard	8.38	4,990
June 3	do	2.1	352	June 3	L. M. Crosley	5.87	2,510
23	do	1.1	95	3	do	5.37	2,170
Sept. 1	H. R. Daubenspeck	1.21	122	Aug. 7	do	1.03	95
13	do	1.75	229	Sept. 19	do	.10	11.4

Daily discharge, in second-feet, of East Fork of Little Miami River at Perintown, Ohio, for the years ending Sept. 30, 1915 and 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1915.						1915.					
1	.....	133	142	69	117	16	23	375	95	495	102
2	.....	413	3,290	337	125	17	21	208	110	925	246
3	.....	474	875	825	88	18	20	582	102	675	220
4	.....	125	538	337	74	19	18	1,640	75	413	356
5	.....	88	2,600	195	2,680	20	20	538	59	394	125
6	.....	65	875	117	3,210	21	23	233	40	1,640	88
7	.....	60	337	82	2,400	22	95	142	35	1,980	75
8	37	375	1,380	220	6,200	23	95	102	30	875	61
9	41	117	1,380	474	1,440	24	195	73	27	453	51
10	45	70	1,500	413	675	25	117	58	23	2,460	49
11	34	54	495	1,700	825	26	2,540	45	24	875	39
12	29	413	320	6,320	375	27	582	35	24	356	825
13	32	195	195	1,020	233	28	289	32	110	220	638
14	25	151	162	1,020	162	29	538	151	474	162	320
15	24	875	125	925	125	30	304	162	375	274	184
						31	151	.....	74	110	.....

Daily discharge, in second-feet, of East Fork of Little Miami River at Perintown, Ohio, for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,620	42	133	2,900	3,210	184	394	151	304	53	10	195
2	1,700	38	133	3,540	675	184	320	117	162	46	10	142
3	495	37	172	1,260	394	151	975	125	2,400	31	10	208
4	304	36	195	627	304	133	1,020	474	453	21	10	110
5	433	35	184	627	260	133	1,640	1,640	208	24	82	69
6	356	31	133	1,140	413	195	356	208	304	19	41	54
7	274	30	117	516	516	7,200	274	133	1,200	16	54	75
8	172	28	110	356	289	1,760	304	1,640	453	14	725	88
9	125	27	102	274	233	675	1,700	453	289	13	582	82
10	102	32	88	1,640	195	495	1,700	184	233	13	260	73
11	88	29	88	8,350	246	433	775	125	413	13	117	52
12	74	42	95	13,700	2,900	320	453	102	246	13	67	31
13	71	59	184	8,950	2,540	260	320	82	162	13	61	24
14	70	64	220	1,380	1,020	246	260	73	102	14	55	20
15	70	725	184	538	725	1,500	195	63	82	13	52	18
16	337	495	246	375	675	925	151	59	233	13	73	16
17	151	246	18,300	151	1,500	675	125	69	195	13	52	14
18	133	337	8,050	233	2,540	627	133	50	208	13	38	13
19	51	142	1,440	125	1,570	582	117	42	304	125	27	12
20	208	1,700	725	375	825	516	117	44	184	117	24	10
21	133	675	582	1,500	1,380	516	184	40	2,040	38	184	10
22	117	356	337	3,710	825	1,140	184	56	675	31	142	24
23	102	246	289	1,760	285	1,080	151	74	289	16	58	125
24	88	184	289	875	1,260	433	125	62	151	13	34	102
25	74	151	5,300	627	1,080	320	102	73	110	12	31	38
26	67	133	2,820	495	675	825	233	65	102	12	82	19
27	23	125	1,140	453	394	12,100	413	53	64	12	61	16
28	58	142	2,900	627	233	2,980	538	41	45	11	1,640	14
29	55	142	8,650	2,180	208	1,980	474	162	36	11	582	12
30	48	142	5,300	10,600	.....	925	246	2,260	38	11	208	11
31	46	.....	2,320	4,870	.....	538	.....	925	.....	10	110	.....

Monthly discharge of East Fork of Little Miami River at Perintown, Ohio, for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 459 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
May 8–31	2,540	18	221	0.481	0.43
June	1,640	32	266	.580	.65
July	3,290	23	513	1.12	1.29
August	6,320	69	850	1.85	2.13
September	6,200	39	734	1.60	1.78
The period, May 8 to Sept. 30	6,320	18	531	1.16	6.28
1915–16.					
October	3,620	23	311	.678	.78
November	1,700	27	216	.471	.33
December	18,300	88	1,960	4.27	4.92
January	13,700	125	2,410	5.25	6.05
February	3,210	195	962	2.10	2.26
March	12,100	133	1,290	2.81	3.24
April	1,700	102	466	1.02	1.14
May	2,260	40	311	.678	.78
June	2,400	36	390	.850	.95
July	125	10	25.0	.054	.06
August	1,640	10	177	.386	.44
September	208	10	55.9	.122	.14
The year	18,300	10	718	1.56	21.29

LICKING RIVER BASIN.

LICKING RIVER AT FARMERS, KY.

LOCATION.—About 100 feet below the Chesapeake & Ohio Railway bridge and 300 feet below the two-span steel highway bridge three-quarters of a mile west of Farmers, Rowan County

DRAINAGE AREA.—768 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—July 20, 1915, to September 30, 1916.

GAGE.—Combination vertical staff and slope gage on east bank of river, about 100 feet below the Chesapeake & Ohio Railway bridge; read by T. E. Craig.

DISCHARGE MEASUREMENTS.—Made from downstream side of two-span highway bridge 300 feet above gage.

CHANNEL AND CONTROL.—Bed of stream solid rock, straight above and below gage; control is a rock reef about 1 mile below gage.

EXTREMES OF STAGE.—Maximum stage recorded, 24.6 feet December 18, 1915; minimum stage, 1.35 feet September 18, 1915.

ICE.—No information.

REGULATION.—The flow at low stages may be affected by storage of water for use of a sawmill at a movable dam a short distance above the gage. Dam is submerged at gage height 5 feet.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during the year. Rating curve not yet determined. Gage read to half-tenths twice daily.

COOPERATION.—Records furnished by United States Engineer Corps.

Discharge measurements of Licking River at Farmers, Ky., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914–15.		*Feet.*	*Sec.-ft.*	1914–15.		*Feet.*	*Sec.-ft.*
July 19	Crosley and Daubenspeck	2.76	337	July 23	Crosley and Daubenspeck	4.65	1,240
21	do	5.05	1,430				
21	do	5.40	1,600	1915–16.			
22	do	6.54	2,370	Nov. 9	H. R. Daubenspeck	1.7	98.6
22	do	6.07	2,050				

Daily gage height, in feet, of Licking River at Farmers, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1915.				1915.				1915.			
1		3.92	1.85	11		1.74	1.72	21		2.45	1.52
2		2.95	1.82	12		1.7	1.8	22	6.2	3.22	1.53
3		2.6	1.72	13		2.06	1.75	23	4.2	2.7	1.65
4		3.22	1.55	14		2.25	1.5	24	3.24	2.37	1.95
5		2.75	1.72	15		1.67	1.55	25	2.79	2.3	1.8
6		2.75	1.96	16		2.5	1.57	26	2.5	2.35	1.65
7		2.51	2.37	17		2.17	1.47	27	2.3	2.15	1.55
8		1.95	2.3	18		2.48	1.38	28	2.15	1.97	1.5
9		1.86	2.1	19		3.6	1.9	29	2.05	1.92	1.45
10		1.8	1.92	20		2.77	1.6	30	2.0	1.87	1.45
								31	2.12	1.85	

Daily gage height, in feet, of Licking River at Farmers, Ky., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	7.6	1.9	.....	11.1	17.0	4.76	13.1	3.72	3.45	2.72	1.87	2.07
2	10.7	1.85	3.75	9.9	13.5	5.6	5.93	3.47	2.99	2.16	1.89	3.33
3	7.4	1.85	3.6	7.7	8.88	6.88	5.35	3.47	2.75	2.09	1.8	3.81
4	4.3	1.8	3.4	6.3	6.73	6.7	4.95	9.8	2.67	2.07	1.89	3.38
5	4.1	1.75	3.25	5.6	6.13	6.35	4.6	9.2	2.57	1.99	1.83	2.89
6	3.9	1.75	3.05	6.1	6.5	5.7	4.34	5.88	2.47	1.99	1.92	2.46
7	4.7	1.7	2.95	6.2	6.98	7.4	4.12	4.78	3.2	1.92	1.99	2.33
8	3.7	1.7	2.75	6.3	6.7	10.0	4.68	4.54	3.54	1.89	2.84	2.16
9	3.0	1.7	2.75	6.2	6.23	8.2	8.15	4.2	3.15	1.89	2.41	2.16
10	2.7	1.65	2.6	7.2	6.43	6.2	9.7	3.79	2.99	1.87	2.5	2.13
11	2.50	1.65	2.55	11.7	6.98	4.49	10.2	3.49	3.52	1.83	3.38	2.13
12	2.35	1.65	2.75	20.6	6.23	4.64	7.65	3.3	3.72	1.89	3.2	2.04
13	2.25	1.7	3.2	21.4	12.6	4.38	6.5	3.1	3.74	1.99	4.3	1.99
14	2.15	1.75	3.75	20.4	9.08	4.26	5.4	2.91	2.94	1.92	4.2	1.92
15	2.07	2.3	3.85	16.1	6.98	4.47	4.86	2.84	4.84	1.89	4.2	2.21
16	2.03	10.0	5.0	8.6	6.45	4.66	4.54	2.75	6.23	2.02	10.3	2.26
17	1.95	14.0	21.0	6.18	6.0	4.84	4.36	2.65	7.48	2.16	11.1	2.12
18	1.95	10.5	24.5	5.9	5.7	4.88	4.1	2.55	5.53	3.65	5.4	2.02
19	2.0	5.3	23.7	4.58	5.3	4.84	3.91	2.47	18.4	2.52	3.86	1.99
20	5.6	8.0	22.0	4.5	4.73	4.55	3.69	2.41	19.5	3.28	3.62	1.89
21	4.2	9.15	19.2	4.58	4.5	4.62	3.52	2.31	9.63	4.41	4.17	1.83
22	3.5	6.4	10.0	6.4	4.15	4.7	3.43	2.28	4.7	4.31	3.79	1.8
23	3.0	5.1	5.4	8.03	4.0	4.49	3.33	2.36	3.98	3.74	3.1	1.8
24	2.7	4.1	4.7	7.3	4.45	4.37	3.2	2.62	3.45	2.91	2.82	1.7
25	2.48	3.7	4.8	6.4	5.8	4.01	3.15	2.52	4.1	2.47	2.75	1.7
26	2.43	3.4	6.0	5.48	6.15	3.86	3.2	2.38	2.99	2.23	2.55	1.73
27	2.25	3.12	6.6	4.83	6.15	9.3	3.67	2.26	2.75	2.05	3.01	1.7
28	2.2	3.9	8.2	4.45	5.35	18.8	4.27	2.12	2.6	2.07	2.28	1.75
29	2.13	6.2	17.4	4.78	5.0	21.5	4.17	2.09	2.5	2.13	2.26	1.8
30	2.05	4.55	20.7	12.3	.....	20.5	3.93	2.52	2.36	1.99	2.16	1.65
31	2.98	.....	18.1	8.0	.....	17.7	.....	3.96	.....	1.97	2.09	.....

LICKING RIVER AT FALMOUTH, KY.

LOCATION.—At two-span highway bridge at junction of Milford Pike and West Ferry Street, Falmouth, Pendleton County, about 500 feet above mouth of South Fork.

DRAINAGE AREA.—3,240 square miles (including South Fork).

RECORDS AVAILABLE.—January 1, 1914, to July 31, 1916, when station was discontinued.

GAGE.—United States Weather Bureau chain gage attached to downstream side of bridge. Read by Jessie Oldham. Elevation of zero of gage, 512.17 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—The low-water control is between the gage and mouth of South Fork of Licking River. For stages above about 2.6 feet the gage height is an index of the flow below the mouth of South Fork.

EXTREMES OF DISCHARGE.—1914–1916: Maximum stage recorded, 31.0 feet December 18, 1915 (discharge, about 56,800 second-feet); minimum stage recorded, 1.0 foot July 11–16 and September 30, 1914 (discharge, not known, as no record is available as to the flow of South Fork on those dates).

ACCURACY.—Stage-discharge relation practically permanent for medium and high stages; not affected by ice during year. Rating curve well defined between 1,000 and 32,000 second-feet, when the gage height is an index of the flow below mouth of South Fork, as noted under "Channel and control." For stages below 2.6 feet a fairly well defined rating curve was used. Gage read twice daily to hundredths. For stages above 2.6 feet the daily discharge below mouth of South Fork was ascertained by applying mean daily gage heights to rating table. For stages below 2.6 feet daily discharge below mouth of South Fork was ascertained by adding the flow of Licking River above mouth of South Fork, as computed from a fairly well defined rating curve, to the flow of South Fork as ascertained for the station on South Fork at Falmouth. Results good above 1,000 second-feet; fairly good below 1,000 second-feet.

COOPERATION.—Gage-height record and results of discharge measurements furnished by the United States Army Engineers.

Discharge measurements of Licking River at Falmouth, Ky., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge in second-feet.		
			Licking River above mouth of South Fork.[a]	South Fork.[b]	Below mouth of South Fork.
1914–15.		*Feet.*			
July 28	Crosley and Daubenspeck	2.25	509	.....	.....
Sept. 9	H. R. Daubenspeck	3.18	945	824	1,770
1915–16.					
Oct. 4	Crosley and Daubenspeck	6.44	5,540	1,460	7,000
5	.....do	5.22	3,790	1,180	4,970
Nov. 8	.....do	1.6	203	.....	.....
Jan. 31	Crosley and Shepard	18.00	18,300	11,000	29,300
Feb. 1	A. C. Shepard	16.82	17,700	9,100	26,800
2	.....do	15.75	16,700	8,300	25,000
2	.....do	14.9	17,300	7,000	24,300
3	.....do	12.56	14,700	3,400	18,100
4	.....do	9.00	10,100	2,000	12,100
5	.....do	6.3	5,370	1,540	6,910

[a] Current-meter measurement.
[b] Ascertained from rating curve for South Fork of Licking River at Falmouth and gage height at that station at time when flow of Licking River above mouth of South Fork was measured by current meter.

Daily discharge, in second-feet, of Licking River at Falmouth, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1915.			1915.			1915.		
1	495	1,830	11	598	1,070	21	3,120	1,040
2	1,000	1,070	12	659	1,020	22	2,500	774
3	2,120	1,140	13	829	798	23	2,650	624
4	4,740	858	14	754	654	24	3,120	489
5	4,240	4,740	15	1,200	530	25	5,590	416
6	2,500	3,920	16	1,200	540	26	3,920	349
7	1,340	2,050	17	1,070	416	27	2,350	341
8	1,350	2,350	18	4,740	336	28	1,340	232
9	773	1,690	19	2,650	605	29	878	343
10	663	1,480	20	2,650	1,280	30	1,830	270
						31	2,800	.....

Daily discharge, in second-feet, of Licking River at Falmouth, Ky., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1915–16.										
1	790	289	2,800	19,500	27,000	3,440	19,300	2,050	1,760	772
2	16,100	259	2,120	19,500	24,100	3,280	14,500	1,690	1,480	616
3	13,200	233	1,830	14,900	17,900	3,760	6,950	1,550	1,270	488
4	7,820	210	1,690	10,500	11,600	5,250	4,240	3,920	940	384
5	3,600	207	1,480	6,780	7,120	5,080	3,280	5,760	748	355
6	2,350	242	1,270	8,720	6,100	5,420	2,800	7,640	1,070	289
7	1,620	222	1,140	7,120	6,950	14,400	2,500	5,080	2,650	314
8	1,830	239	952	6,780	6,780	11,400	2,350	2,960	4,570	256
9	1,980	243	860	5,590	6,100	10,200	4,910	2,350	4,240	229
10	1,340	250	810	6,610	5,250	7,640	6,950	1,900	2,200	214
11	940	240	776	22,100	5,080	4,740	7,460	1,620	2,960	200
12	888	242	806	42,500	6,610	4,080	7,290	1,270	2,960	184
13	741	233	1,000	47,400	28,200	3,280	6,440	1,070	2,350	179
14	750	320	2,120	39,600	24,300	1,980	4,740	940	1,690	184
15	668	5,080	2,500	26,800	15,700	15,100	3,600	844	1,140	180
16	603	9,980	2,960	21,500	9,980	9,080	2,350	765	878	158
17	508	11,100	49,400	14,900	8,720	7,120	2,800	717	3,760	182
18	454	8,720	56,800	6,610	9,800	5,930	2,500	610	3,280	212
19	715	15,700	50,100	3,440	8,000	5,760	2,350	515	14,200	726
20	1,180	14,000	34,800	3,280	5,760	4,910	1,900	510	27,400	815
21	1,040	11,400	27,800	3,760	4,400	4,570	1,690	473	24,900	1,900
22	2,050	7,120	25,100	8,360	3,600	4,400	1,480	462	18,500	2,650
23	1,480	4,080	20,100	12,500	3,120	4,080	1,340	534	9,080	1,830
24	1,070	2,650	11,800	11,200	8,540	3,440	1,200	508	2,960	1,550
25	878	1,900	9,620	8,000	7,290	2,800	1,140	476	1,900	1,200
26	620	1,480	8,200	6,270	7,290	3,440	1,140	460	1,480	906
27	456	1,340	9,260	4,570	5,760	12,000	1,270	454	1,140	671
28	396	1,480	10,900	3,600	4,910	15,100	1,690	467	940	483
29	369	2,800	25,100	5,590	4,080	25,700	2,800	434	888	394
30	317	3,280	35,000	37,100	.....	26,100	2,650	745	886	320
31	307	.....	25,300	30,100	.....	22,700	.....	781	.....	273

NOTE.—Gage height Dec. 26, 1915, believed to be erroneous; discharge interpolated.

Monthly discharge of Licking River at Falmouth, Ky., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 3,240 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
August	5,590	495	2,120	0.654	0.75
September	4,740	232	1,110	.343	.38
1915–16.					
October	16,100	307	2,160	.667	.77
November	15,700	207	3,520	1.09	1.22
December	56,800	776	13,700	4.23	4.88
January	47,400	3,280	15,000	4.63	5.34
February	28,200	3,120	10,000	3.09	3.33
March	26,100	1,980	8,260	2.55	2.94
April	19,300	1,140	4,190	1.29	1.44
May	7,640	434	1,600	.494	.57
June	27,400	748	4,810	1.48	1.71
July	2,650	158	617	.190	.22

LICKING RIVER AT CATAWBA, KY.

LOCATION.—About 200 feet below Catawba ford, about one-fourth mile north of Catawba, Pendleton County. Kinkoid Creek enters from the right about 1,000 feet below the gage.

DRAINAGE AREA.—3,300 square miles. (United States Engineer Corps.)

RECORDS AVAILABLE.—July 14 to September 30, 1916.

GAGE.—Combination slope and vertical staff on south bank of river about 200 feet below the ford; read by G. A. Frank. Elevation of zero of gage, 498.37 feet above sea level, corresponds approximately with 69 feet on the United States Weather Bureau gage on Ohio River at Cincinnati, Ohio.

DISCHARGE MEASUREMENTS.—Made from cable about 500 feet upstream from gage.

CHANNEL AND CONTROL.—Bed of river at cable is mostly ledge rock. The banks are heavily wooded above an elevation of about 7 feet on the gage. The control is a rock bar just below the mouth of Kinkoid Creek; probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during period of records, 8.10 feet, August 18; minimum stage, 1 foot, September 28.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during the year. Rating curve not yet determined. Gage read twice daily to hundredths.

COOPERATION.—Base data furnished by United States Engineer Corps.

No discharge measurements made at this station during the year.

Daily gage height, in feet, of Licking River at Catawba, Ky., for the year ending Sept. 30, 1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	1.15	1.61	11	.....	3.64	2.07	21	4.54	3.13	1.09
2	.....	1.14	4.10	12	.....	3.54	2.02	22	4.07	3.1	1.08
3	.....	1.10	.....	13	.....	3.06	1.2	23	4.07	3.08	1.08
4	.....	1.08	5.04	14	1.1	3.06	1.19	24	4.0	3.04	1.06
5	.....	1.07	4.04	15	1.08	3.21	1.17	25	3.12	3.03	1.05
6	.....	2.56	3.06	16	1.08	5.5	1.13	26	2.71	3.04	1.03
7	.....	2.14	4.6	17	1.08	7.1	1.11	27	2.09	2.58	1.03
8	.....	2.10	3.06	18	1.08	8.1	1.10	28	2.06	2.09	1.0
9	.....	2.59	4.1	19	1.57	7.1	1.14	29	2.04	2.06	1.04
10	.....	4.67	2.6	20	3.08	4.6	1.14	30	1.22	2.02	1.12
								31	1.17	2.0	.....

LICKING RIVER AT MORNING VIEW, KY.

LOCATION.—About 700 feet upstream from Rouse's ford at Morning View, Kenton County. Cruisers Creek enters from the left about 1 mile below the gage.

DRAINAGE AREA.—3,520 square miles. (United States Engineer Corps.)

RECORDS AVAILABLE.—September 17, 1915 to September 30, 1916, when station was discontinued because stage-discharge relation is at times affected by backwater from Ohio River.

GAGE.—Slope gage in two sections on west bank of river; lower section, extending to 15 feet, is about 700 feet above Rouse's ford; upper section is attached to the crossties of the inclined track of the Louisville & Nashville Railroad pumping station and is about 500 feet downstream from the lower section. Gage read by T. B. Asbill. Sea-level elevation of zero of gage, 465.95 feet.

DISCHARGE MEASUREMENTS.—Made from cable just above Rouse's ford.

CHANNEL AND CONTROL.—Bed of river composed of ledge rocks. Above a stage of 6 feet the banks are covered with a thick growth of willows. Principal control is a permanent bar just below the mouth of Cruisers Creek, about a mile below the gage. Another bar about three-fourths mile below the gage forms a secondary control.

EXTREMES OF DISCHARGE.—September 18, 1915 to September 30, 1916: Maximum stage recorded, 37.5 feet December 18, 1915 (discharge, 55,500 second-feet); minimum stage, 1.3 feet September 28, 1916 (discharge, 70 second-feet).

ACCURACY.—Stage-discharge relation permanent except for occasional backwater from Ohio River, and the varying effect of rising and falling stage. Rating curve fairly well defined between 200 and 40,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table except for periods when backwater was caused by Ohio River, when discharge was determined from the flow below mouth of South Fork at Falmouth. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Licking River at Morning View, Ky., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914-15.		*Feet.*	*Sec.-ft.*	1915-16.		*Feet.*	*Sec.-ft.*
Sept. 7	Daubenspeck and J. L. T.	5.3	2,410	June 20	A. C. Shepard	18.78	23,700
8	do	7.4	4,960	20	Crosley and Shepard	19.58	24,600
8	do	6.10	3,300	20	do	20.23	25,300
21	H. R. Daubenspeck	3.2	812	20	do	20.79	25,800
1915-16.				21	A. C. Shepard	22.94	27,400
Oct. 5	Crosley and Daubenspeck	7.03	4,820	21	do	22.57	25,400
6	do	5.55	2,920	21	do	21.70	24,600
Nov. 9	L. M. Crosley	1.85	224	22	do	17.93	19,800
19	do	15.45	17,500	22	do	17.36	19,400
23	H. R. Daubenspeck	7.43	4,890	22	do	16.88	18,700
Dec. 30	L. M. Crosley	26.85	35,100	22	do	16.2	18,100
June 19	A. C. Shepard	13.65	16,000	23	do	13.2	14,000
20	do	17.81	22,200	23	do	12.4	12,500
				23	do	11.60	11,300
				23	do	10.32	9,950

Daily discharge, in second-feet, of Licking River at Morning View, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	Sept.	Day.	Sept.	Day.	Sept.
1915.		1915.		1915.	
1		11		21	810
2		12		22	660
3		13		23	542
4		14		24	460
5		15		25	400
6		16		26	320
7		17		27	280
8		18	380	28	300
9		19	440	29	280
10		20	685	30	280

Daily discharge, in second-feet, of Licking River at Morning View, Ky., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	810	360	2,900	21,000	29,000	3,700	20,800	2,170	1,050	810	480	380
2	10,900	320	2,370	21,000	26,000	3,340	15,700	1,720	1,640	635	262	1,720
3	15,400	360	1,810	16,100	19,300	3,580	7,500	1,560	2,170	542	210	2,080
4	8,290	280	1,810	11,300	12,500	4,840	4,600	3,230	1,190	460	180	2,370
5	5,230	245	1,640	7,300	7,700	5,230	3,500	4,710	870	420	150	1,810
6	2,570	228	1,480	9,400	6,600	5,770	3,000	7,630	1,480	400	400	1,190
7	1,720	245	1,330	7,700	7,500	15,600	2,680	5,490	3,010	300	710	2,170
8	1,640	228	1,190	7,300	6,980	11,900	2,790	3,230	4,060	280	588	1,050
9	1,810	210	1,050	6,000	6,350	10,100	4,970	2,270	4,710	245	710	1,990
10	1,330	210	930	7,100	5,360	8,120	6,200	1,900	3,010	228	1,990	1,050
11	1,050	195	930	23,900	5,100	4,710	7,390	1,560	2,370	210	2,080	635
12	810	300	870	46,000	9,280	4,450	6,980	1,330	3,010	210	1,260	460
13	685	228	1,190	51,000	25,600	3,460	6,500	1,120	2,680	195	1,260	380
14	610	420	1,900	42,800	25,400	3,580	4,970	930	1,990	180	930	320
15	660	4,320	2,570	28,900	17,000	16,000	3,700	930	1,400	180	1,330	280
16	635	7,960	3,940	23,000	10,800	10,100	3,010	810	1,640	180	1,640	245
17	460	11,100	46,100	16,000	10,100	7,460	2,790	760	2,370	180	4,970	210
18	440	9,120	55,100	7,100	10,600	6,050	2,570	685	3,460	180	6,200	180
19	440	17,600	52,700	3,700	8,620	5,770	2,270	610	10,600	165	5,490	180
20	480	13,400	37,600	3,500	6,200	5,230	1,990	542	22,300	760	2,790	210
21	460	12,400	30,000	4,710	4,840	4,840	1,810	520	26,000	1,330	1,480	210
22	480	7,960	27,100	7,300	3,940	4,450	1,640	542	20,100	1,990	1,120	180
23	1,330	4,710	21,700	12,200	3,460	4,190	1,480	610	11,600	1,810	1,120	150
24	990	3,010	12,700	12,100	7,300	3,700	1,330	565	3,700	1,480	1,120	120
25	760	2,370	10,400	8,620	7,630	3,120	1,190	520	2,170	1,330	930	120
26	685	1,810	8,780	6,350	7,630	3,710	1,330	520	1,640	990	930	95
27	588	1,480	9,280	4,970	6,050	13,000	1,480	588	1,330	710	710	95
28	500	1,480	11,800	3,940	5,100	16,300	1,560	565	1,050	520	810	70
29	440	2,270	22,600	7,960	4,320	27,800	2,370	610	930	440	542	95
30	440	3,230	34,100	36,700	.....	28,200	2,680	1,480	810	380	460	180
31	400	.....	27,300	34,700	.....	24,500	.....	810	.....	430	380	.....

NOTE.—Discharge estimated from flow at Falmouth on account of backwater from Ohio River, as follows: Dec. 20–25, Jan. 1–20, Feb. 1–7 and 15–16, Mar. 26–31, Apr. 1–6.

Monthly discharge of Licking River at Morning View, Ky., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 3,520 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
September 18–30	810	280	449	0.128	0.06
1915–16.					
October	15,400	400	2,030	.577	.67
November	17,600	195	3,600	1.02	1.14
December	55,100	870	14,000	3.98	4.59
January	51,000	3,500	16,100	4.57	5.27
February	29,000	3,460	10,600	3.01	3.25
March	28,200	3,120	8,800	2.50	2.88
April	20,800	1,190	4,360	1.24	1.38
May	7,630	520	1,630	.463	.53
June	26,000	810	4,810	1.37	1.53
July	1,990	165	572	.162	.19
August	6,200	150	1,390	.395	.46
September	2,370	70	674	.191	.21
The year	55,100	70	5,720	1.62	22.10

SOUTH FORK OF LICKING RIVER AT HAYES, KY.

LOCATION.—At two-span steel highway bridge at Hayes, Pendleton County, about 2½ miles south of Falmouth.

DRAINAGE AREA.—922 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—July 7 to September 30, 1916.

GAGE.—Chain gage attached to downstream handrail of bridge; read by J. K. Frazer. Sea-level elevation of zero of gage, 540.10 feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Bed of river composed of ledge rock; banks lined with vegetation. Control, about 800 feet below gage; probably permanent. Backwater begins to affect the stage-discharge relation at this station when the main Licking River reaches a stage of about 28 feet on the gage at Falmouth.

EXTREMES OF STAGE.—Maximum stage recorded during period of records, 4.9 feet July 21, 1916; minimum stage recorded, 0.48 foot September 24, 1916.

ICE.—Stage-discharge relation not affected by ice except during severe winters.

ACCURACY.—Stage-discharge relation probably permanent, except as affected by backwater from the Licking. Not affected by ice during the year. Rating curve not yet determined. Gage read twice daily to hundredths.

COOPERATION.—Base data furnished by United States Engineer Corps.

The following discharge measurement was made by Crosley and Shepard:
July 7, 1916: Gage height, 1.00 foot; discharge, 59.0 second-feet.

Daily gage height, in feet, of South Fork Licking River at Hayes, Ky., for the year ending Sept. 30, 1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	1.96	0.91	12	0.86	1.20	0.85	23	2.46	1.05	0.52
2	.....	.90	3.14	13	.84	1.04	.82	24	2.03	.90	.49
3	.....	.81	1.74	14	.87	.91	.84	25	1.72	.83	.49
4	.....	.80	1.11	15	1.02	1.13	.84				
5	.....	.80	.88					26	1.55	.81	.51
				16	.85	1.53	.73	27	1.39	.83	.50
6	.....	.67	.77	17	.80	1.18	.70	28	1.26	.95	.55
7	0.92	.75	.69	18	.83	1.06	.62	29	1.27	.99	.64
8	.97	.82	1.30	19	1.64	1.35	.56	30	1.11	.94	.64
9	.92	1.21	1.20	20	2.11	1.31	.50	31	1.01	.89	.....
10	.94	1.73	1.17	21	3.84	1.27	.55				
11	.93	1.40	1.01	22	3.04	1.16	.60				

SOUTH FORK OF LICKING RIVER AT FALMOUTH, KY.

LOCATION.—At the single-span highway bridge about half a mile west of the Louisville & Nashville Railroad station at Falmouth, Pendleton County, and three-fourths mile above the mouth of the river.

DRAINAGE AREA.—944 square miles.

RECORDS AVAILABLE.—July 27, 1915, to July 31, 1916, when station was discontinued because of backwater from Licking River.

GAGE.—Staff gage in two sections; lower section attached to downstream side of west abutment of bridge; upper section attached to telegraph pole 4 feet from upstream side of west abutment; read by L. A. Wooley.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed of river is rock; banks practically clear of vegetation. Control probably permanent, but stage-discharge relation is occasionally affected by backwater from Licking River.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 22.4 feet December 18, 1915 (discharge not estimated because of backwater from Licking River); minimum stage recorded, 1.3 feet November 11, 1915 (discharge, 20 second-feet).

ACCURACY.—Stage-discharge relation affected by backwater from Licking River during high stages on that stream. Rating curve fairly well defined between 90 and 10,000 second-feet. Gage read to hundredths twice daily, Daily discharge, except for periods when backwater was present, ascertained by applying mean daily gage heights to rating table. Results good except for periods when there was backwater at gage. See footnote to daily discharge.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of South Fork of Licking River at Falmouth, Ky., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914–15.				1915–16.			
July 27	Crosley and Daubenspeck	*Feet.* 1.6	*Sec.-ft.* 96.5	Oct. 5	Crosley and Daubenspeck	*Feet.* 3.55	*Sec.-ft.* 1,150
Sept. 9	H. R. Daubenspeck	3.0	740	Feb. 1	A. C. Shepard	8.71	9,070
				2	do	7.63	7,600
				4	do	4.45	2,020

Daily discharge, in second-feet, of South Fork of Licking River at Falmouth, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1915.				1915.				1915.			
1		58	1,050	11		125	485	21		1,500	680
2		45	620	12		135	360	22		1,320	510
3		34	485	13		228	280	23		1,600	360
4		1,000	340	14		224	240	24		1,600	280
5		960	2,530	15		538	170	25		1,100	228
6		650	2,400	16		538	200	26		650	182
7		385	1,320	17		1,100	132	27	96	650	146
8		592	1,600	18		3,560	99	28	81	538	48
9		216	810	19		2,030	360	29	66	385	109
10		152	650	20		1,100	810	30	45	360	96
								31	34	1,230	

Daily discharge, in second-feet, of South Fork of Licking River at Falmouth, Ky., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1915–16.										
1	260	66	360	.....	9,100	920	1,500	340	200	280
2	8,910	53	280	.....	7,600	920	1,350	320	146	196
3	3,890	45	260	.....	3,240	1,000	1,230	280	300	128
4	1,600	40	240	2,400	2,030	1,140	1,000	710	132	109
5	1,050	40	240	1,810	1,600	1,050	845	740	128	75
6	775	40	240	1,600	1,500	1,500	710	680	260	66
7	592	20	224	1,920	1,600	4,760	620	485	1,230	66
8	485	30	204	1,500	1,600	3,720	740	385	810	61
9	410	34	200	1,410	1,320	2,530	1,230	300	1,140	48
10	360	30	174	1,810	1,230	1,600	1,410	260	810	40
11	260	20	163	.....	1,140	1,230	1,320	240	680	36
12	220	22	200	.....	1,140	1,050	1,050	220	810	38
13	170	24	385	.....	8,000	845	845	204	740	40
14	220	45	538	.....	6,000	960	710	163	565	48
15	189	1,810	280	.....	3,770	4,760	680	160	435	48
16	200	3,240	1,600	.....	2,530	2,660	565	152	340	26
17	132	2,030	.....	1,700	2,530	2,030	620	146	510	40
18	99	1,050	.....	1,230	2,800	1,700	620	106	410	66
19	360	5,900	.....	880	2,270	1,600	565	66	4,400	66
20	810	5,900	.....	1,100	1,700	1,410	460	90	13,000	460
21	680	3,090	.....	1,140	1,410	1,320	410	75	6,400	1,700
22	510	1,600	.....	1,600	1,140	1,140	360	81	2,020	1,050
23	189	1,100	.....	3,720	1,000	1,050	340	142	1,230	538
24	128	775	1,320	2,940	3,400	845	320	138	740	320
25	135	620	4,760	1,920	3,400	775	320	106	592	310
26	128	485	2,660	1,500	2,800	1,500	320	90	485	300
27	96	460	2,940	1,230	1,810	2,800	360	78	435	240
28	66	435	3,890	1,050	1,410	3,720	435	81	360	138
29	81	385	10,800	2,660	1,140	5,000	410	84	260	106
30	72	385	.....	.....	.....	4,000	385	260	280	90
31	66	.....	.....	.....	.....	2,500	.....	196	.....	61

NOTE.—Discharge for following days estimated because of backwater from Licking River, from weather records and record of stage of Licking River at Falmouth: Feb. 1, 2, 13, 14, Mar. 29–31, Apr. 1–2, and June 20–22, 1916. Discharge interpolated July 28, 1915, May 28 and July 25, 1916. Discharge, Dec. 17–23, 30, and 31, 1915, Jan. 1–3, 11–16, and 30–31, 1916, not estimated because of backwater.

Monthly discharge of South Fork of Licking River at Falmouth Ky., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 944 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
August	3,560	34	794	0.841	0.97
September	2,530	48	586	.621	.69
1915–16.					
October	8,910	66	747	.791	.91
November	5,900	20	992	1.05	1.17
December	.....	163	.....	.....	.....
January	.....	880	.....	.....	.....
February	.....	1,000	2,770	2.93	3.16
March	.....	775	2,000	2.12	2.44
April	.....	320	724	.767	.86
May	740	66	238	.252	.29
June	.....	128	1,330	1.41	1.57
July	1,700	26	219	.232	.27

MILL CREEK BASIN.

MILL CREEK AT ARLINGTON HEIGHTS, OHIO.

LOCATION.—At Arlington Heights, Hamilton County, about 1,000 feet below confluence of East and West forks of Mill Creek.

DRAINAGE AREA.—109 square miles.

RECORDS AVAILABLE.—September 19, 1912, to May 31, 1916.

GAGE.—Inclined staff fastened to posts on right bank; read by Russell Harris.

DISCHARGE MEASUREMENTS.—Made from boat at section or by wading both forks.

CHANNEL AND CONTROL.—Probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year; 7.02 feet at 7 a. m. December 29; minimum stage, 0.30 foot from 5 p. m. October 1 to 7 a. m. October 4.

ICE.—Stage-discharge relation affected by ice during severe winters.

ACCURACY.—Stage-discharge relation probably permanent; not seriously affected by ice during the year. Rating curve not developed. Gage read to half-tenths twice daily.

COOPERATION.—Station maintained in cooperation with the Division of Sewerage Investigation of the Department of Public Service of the City of Cincinnati, Ohio.

Daily gage height, in feet, of Mill Creek at Arlington Heights, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	1.22	0.35	0.60	2.52	1.07	1.20	3.53	1.00
2	1.20	.30	.66	1.09	.90	1.25	2.04	1.26
3	1.20	.30	60	1.05	.90	1.28	1.54	1.52
4	1.80	.31	.60	1.12	.84	1.20	1.03	.85
5	1.25	.33	.60	95	.80	1.02	1.02	.70
6	1.20	.33	.60	1.02	.90	1.02	1.02	.60
7	1.20	.33	.66	1.03	.90	1.04	1.02	.60
8	1.20	.33	.60	1.02	.90	1.58	1.12	.60
9	1.20	.33	.60	1.03	1.01	1.07	1.11	.60
10	1.20	.40	.66	1.54	1.00	1.04	1.02	.60
11	1.20	.44	.66	3.04	1.00	1.02	1.28	.50
12	1.20	.55	.60	3.56	2.57	1.11	1.12	.50
13	1.20	.55	.60	4.54	2.01	1.20	1.02	.50
14	1.22	.60	.52	2.52	1.65	1.04	1.02	.50
15	1.22	.50	.50	2.00	1.20	1.02	1.02	.50
16	1.20	.55	.60	1.03	1.00	1.02	1.02	.50
17	.95	.55	4.35	1.03	2.96	1.02	1.02	.50
18	.80	.44	1.85	1.03	2.65	1.02	1.02	.55
19	.80	2.40	1.02	1.18	1.45	1.02	1.02	.55
20	.80	1.04	1.01	1.56	1.20	1.02	1.02	.55
21	.90	.88	1.01	1.04	1.20	1.02	1.12	.55
22	.80	.80	1.00	1.04	1.20	1.12	1.12	.78
23	.80	.77	.99	1.03	1.25	1.02	1.02	.50
24	.80	.70	.99	1.03	2.55	1.02	1.02	.44
25	.70	.70	1.51	1.03	1.50	1.04	1.02	.44
26	.58	.66	.99	1.33	1.25	1.06	1.18	.40
27	.55	.60	90	1.04	1.50	1.54	1.12	.40
28	.50	.60	.94	1.05	1.30	1.06	1.02	.44
29	.50	.60	6.01	2.55	1.20	1.54	1.02	1.25
30	.44	.60	1.56	3.56	.....	1.02	1.01	1.25
31	.40	.....	2.03	2.02	.....	1.02	.....	.77

MIAMI RIVER BASIN.

MIAMI RIVER AT SIDNEY, OHIO.

LOCATION.—At the North Street Bridge, Sidney, Shelby County, Ohio.

DRAINAGE AREA.—555 square miles.

RECORDS AVAILABLE.—February 1, 1914, to September 30, 1916.

GAGE.—Vertical staff attached to downstream side of west abutment; read by H. B. Blake. Elevation of zero of gage, 926.46 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from downstream side of the bridge at the gage, from the upstream side of highway bridge about 1,000 feet below the gage, or by wading.

CHANNEL AND CONTROL.—Shift during floods. The foliage along the banks may cause some backwater at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.4 feet January 31 (discharge, 12,200 second-feet); minimum, −1.3 feet August 3, 4, 6, and 7 (discharge, 18 second-feet).

The flood of March-April, 1913—the highest known to have occurred at this station—reached a stage on March 25, represented by 17.9 feet on gage.

ICE.—Stage-discharge relation may be affected by ice during short periods.

REGULATION.—A small power plant a short distance above the gage draws water from the Miami & Erie Canal feeder (see "Diversions,") and discharges it into the river above the gage. Another power plant takes water from Tawawa Creek and discharges it into the river above the point of control, which is just below the gage; this power plant is not in operation during the greater part of the summer for lack of water. The flow is practically unregulated by these power plants.

DIVERSIONS.—Water to feed the Miami & Erie Canal is diverted from the river at Port Jefferson, but a part of it is returned to the river above the gage. The amount diverted past the gage may be a large proportion of the low-water flow at the gage. See measurements of flow in feeder in this report. Water diverted is not included in the table of daily discharge.

ACCURACY.—Stage-discharge relation practically permanent; not seriously affected by ice during the year. Rating curve fairly well defined above 44 second-feet. Gage read daily to tenths. Daily discharge ascertained by applying daily gage heights to rating table. Results good. There was a shift in the control about June 20, 1915. Daily discharge June 20 to September 30, 1915, as published in Water Supply Paper 403, is therefore too low by about 10 per cent for discharge over 200 second-feet and by from 25 to 50 per cent for discharge below 200 second-feet.

COOPERATION.—Gage-height record furnished by the United States Weather Bureau and results of discharge measurements by the Miami Conservancy District.

Discharge measurements of Miami River at Sidney, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 4	B. H. Petty	−0.42	91	May 31	G. N. Burrell	1.0	362
12	do	−.40	86	June 26	H. R. Daubenspeck	.55	216
Mar. 27	do	8.85	9,463	July 25	do	−1.1	43.8
Apr. 4	do	1.88	847	Sept. 12	G. N. Burrell	−.60	66.5

Discharge measurements of Miami & Erie Canal feeder at Court Street Bridge, Sidney, Ohio, during the years ending Sept. 30, 1914–1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915-16.		*Feet.*	*Sec.-ft.*
July 9	H. R. Daubenspeck	.....	27.9	Nov. 4	B. H. Petty	.....	60.1
1914-15.				Apr. 4	do	.....	54.9
Mar. 4	H. R. Daubenspeck	.....	61.1	Apr. 12	H. R. Daubenspeck	.....	57.2
Apr. 7	do	.....	54.1	May 18	G. N. Burrell	.....	[b] 0
May 13	B. H. Petty	.....	52.3	June 26	H. R. Daubenspeck	.....	38.0
June 22	do	.....	60.5	July 25	do	.....	43.1
Do	do	.....	[a] 63.7	Sept. 12	G. N. Burrell	.....	43.8
Sept. 10	do	.....	54.5				

[a] South Street Bridge. [b] Bank washed out night of May 6, 1916. Flow resumed June 5.

Daily discharge, in second-feet, of Miami River at Sidney, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	410	171	189	2,050	9,310	340	1,280	374	253	84	41	115
2	500	189	155	11,800	4,490	340	710	374	209	69	41	93
3	450	189	155	8,290	2,410	340	550	340	171	69	38	58
4	374	209	155	5,040	1,200	450	770	840	189	63	38	44
5	410	209	189	2,910	840	374	550	500	410	58	41	41
6	340	209	189	2,410	840	410	450	410	410	58	38	58
7	340	209	128	1,600	710	2,140	410	10,600	770	58	38	53
8	340	209	189	1,280	550	2,050	374	4,760	1,280	58	41	44
9	308	209	155	980	550	1,280	410	2,500	910	53	53	44
10	279	209	155	840	410	840	770	1,360	770	58	53	48
11	253	209	189	1,050	340	710	1,050	840	770	58	53	58
12	230	209	209	1,870	410	550	980	710	600	53	63	69
13	209	209	209	5,750	710	500	770	450	450	53	48	58
14	209	209	209	3,600	770	500	710	410	340	58	44	69
15	840	230	230	2,050	650	450	550	374	279	93	44	84
16	650	230	209	1,280	500	450	410	308	253	69	44	128
17	500	230	171	1,050	650	374	340	279	279	58	44	141
18	710	230	1,600	840	650	340	279	230	650	53	44	141
19	1,600	710	980	770	650	308	230	189	710	44	44	141
20	1,280	1,120	450	710	710	308	171	155	450	44	41	155
21	770	770	279	650	600	279	550	155	450	48	41	141
22	600	650	189	1,690	550	5,180	450	189	1,200	84	41	155
23	450	600	230	1,870	600	5,600	340	279	910	63	41	141
24	410	550	253	1,280	840	3,360	308	230	600	48	41	141
25	410	500	910	840	710	2,140	253	189	450	44	41	128
26	374	410	1,780	600	710	1,520	253	171	308	41	41	115
27	340	374	1,200	840	550	7,950	1,360	155	209	41	58	103
28	308	279	980	1,440	500	7,950	1,360	279	171	41	115	171
29	230	189	910	1,520	410	4,490	840	710	128	41	115	209
30	155	171	1,600	3,720	.....	2,800	410	450	103	44	115	171
31	155	.....	1,360	10,700	.....	1,870	.....	340	.....	41	115	.....

NOTE.—No gage readings reported Nov. 7–13; discharge interpolated by means of gage heights at Piqua and on Loramie Creek at Lockington. Water diverted not included in daily discharge.

Monthly discharge of Miami River at Sidney, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 555 square miles.]

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
October	1,600	155	466
November	1,120	171	336
December	1,780	128	510
January	11,800	600	2,620
February	9,310	340	1,130
March	7,950	279	1,810
April	1,360	171	596
May	10,600	155	940
June	1,280	103	489
July	93	41	56.4
August	115	38	53.4
September	209	41	104
The year	11,800	38	762

MIAMI RIVER AT PIQUA, OHIO.

LOCATION.—At North Main Street Bridge at Piqua, Miami County.

DRAINAGE AREA.—842 square miles (determined by the Morgan Engineering Co.).

RECORDS AVAILABLE.—March 6 to June 30, 1914; October 1, 1914, to September 30, 1916. The United States Weather Bureau has obtained daily gage readings since January 1, 1911, and flood stages January 1, 1907, to December 31, 1910.

GAGE.—Mott gage, read by V. D. Crist.

Sea-level elevation of zero of gage, 849 feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of highway bridge, about 3,000 feet below gage, or by wading.

CHANNEL AND CONTROL.—Control shifts somewhat during floods.

EXTREMES OF STAGE.—Maximum stage recorded during year, 11.0 feet at 8 a. m. May 7; minimum stage, 0.7 foot August 25, 26, and 27.

Flood of March–April, 1913, highest known at station, reached stage of 23.3 feet March 25, referred to gage datum.

ICE.—Stage-discharge relation affected by ice during winters.

DIVERSIONS.—Water from the Miami & Erie Canal feeder is taken from the feeder in a hydraulic canal and carried through an inverted siphon under Loramie Creek, thence along the edge of the hills to Piqua, where it is used for power. It is discharged into the canal about a mile below the gage. In addition, water is diverted from the river into the lower canal level about 3 miles above the gage. The total diversion is therefore the flow in the "hydraulic" plus the flow in the canal opposite the gage. See measurements of "hydraulic" and canal in this report.

REGULATION.—Water is taken from the Miami & Erie Canal for power development, but the effect of the regulation is not appreciable.

ACCURACY.—Stage-discharge relation not permanent as shown by discharge measurements; possibly affected by ice for short periods during the winter, although none was reported. Rating curve not developed owing to shifting control. Gage read daily to tenths. Gage-height record previous to October 1, 1914, unreliable.

COOPERATION.—Gage-height record furnished by the United States Weather Bureau. Results of discharge measurements furnished by the Miami Conservancy District.

Discharge measurements of Miami River at Piqua, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 22	B. H. Petty	2.41	1,250	June 27	H. R. Daubenspeck	1.5	261
Jan. 31	do	10.32	20,400	July 26	do	1.0	83.4
June 1	G. N. Burrell	1.64	391	Sept. 13	G. N. Burrell	1.00	82.4

Discharge measurements of Miami & Erie Canal at Ash Street Bridge, Piqua, Ohio, during the years ending Sept. 30, 1914–1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915–16.		*Feet.*	*Sec.-ft.*
Apr. 23	H. R. Daubenspeck		52.5	Nov. 22	Ben H. Petty		81.5
June 11	do		39.8	Apr. 12	H. R. Daubenspeck		[a] 0
July 9	do		42.9	May 18	G. N. Burrell		0
1914–15.				June 27	H. R. Daubenspeck		0
Mar. 4	do		50.5	July 26	do		[b] 4.5
Apr. 8	do		49.3	Sept. 12	G. N. Burrell		0
May 21	Ben H. Petty		44.3				
Sept. 20	do		56.8				

[a] Banks of canal washed out Feb. 1, 1916. [b] Green Street bridge.

Discharge measurements of hydraulic canal, at Piqua, Ohio, during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1915–16.		*Feet.*	*Sec.-ft.*
Mar. 4	H. R. Daubenspeck		[a] 35.9	Apr. 12	H. R. Daubenspeck		[b] 81.1
Apr. 8	do		[a] 57.9	May 18	G. N. Burrell		[c] 1.8
May 21	Ben H. Petty		[a] 61.0	June 27	H. R. Daubenspeck		[a] 36.1
Sept. 20	do		[a] 77.3	July 26	do		[a] 38.5
				Sept. 12	G. N. Burrell		[a] 37.3

[a] Pioneer Pole & Shaft Co., South Main St. [b] City waterworks. [c] Wood Street Bridge.

Daily gage height, in feet, of Miami River at Piqua, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.1	1.2	1.3	4.0	7.9	1.5	3.2	2.1	1.7	1.1	0.9	1.2
2	2.3	1.1	1.2	10.2	5.2	1.4	2.7	1.8	1.6	1.1	.9	1.1
3	2.0	1.1	1.2	7.8	4.0	1.3	2.2	1.8	1.6	1.1	.9	1.1
4	1.9	1.0	1.2	5.7	3.3	1.3	2.3	2.6	1.5	1.0	.9	1.0
5	1.9	1.0	1.2	4.5	2.9	1.8	2.2	2.2	1.5	1.0	.8	1.0
6	1.8	1.0	1.2	4.0	2.7	1.7	2.0	2.0	1.8	1.0	.8	3.3
7	1.8	1.0	1.4	3.6	2.5	3.7	1.9	10.9	2.2	1.0	.9	1.4
8	1.7	1.0	1.3	3.2	2.3	4.0	1.8	6.3	2.8	1.0	1.0	1.2
9	1.7	1.0	1.2	2.9	2.4	3.6	1.9	4.3	2.6	1.0	1.0	1.1
10	1.6	1.0	1.1	2.6	2.1	3.1	2.2	3.4	2.3	1.0	1.0	1.1
11	1.6	1.0	1.0	2.7	1.8	2.7	2.5	3.0	2.1	1.0	1.0	1.1
12	1.5	1.0	1.0	3.7	1.7	2.4	2.3	2.5	2.0	1.0	.9	1.0
13	1.4	1.0	1.0	6.4	2.1	2.1	2.2	2.1	1.9	1.0	.9	1.0
14	1.5	.9	1.0	5.1	1.9	2.0	2.1	2.0	1.7	.9	.8	1.0
15	2.3	.9	1.0	3.5	1.7	1.9	2.0	1.8	1.6	.9	.8	1.1
16	2.1	.9	1.0	3.0	1.9	1.8	1.9	1.8	1.6	.9	.8	1.1
17	1.9	.9	1.2	2.6	2.1	1.8	1.8	1.6	1.7	.9	.8	1.2
18	2.9	.9	3.4	2.3	2.2	1.8	1.6	1.6	2.0	.9	.8	1.2
19	3.4	2.7	3.0	2.0	2.2	1.7	1.5	1.5	2.2	.9	.8	1.2
20	2.9	3.2	2.7	2.0	2.2	1.7	1.4	1.4	1.9	.9	.8	1.2
21	2.5	2.9	2.4	2.2	2.1	1.7	3.2	1.4	1.9	.9	.8	1.2
22	2.2	2.6	2.0	4.0	1.9	5.3	2.8	1.5	3.2	1.0	.8	1.2
23	2.0	2.4	1.9	3.5	2.1	5.9	2.5	1.7	2.8	1.0	.8	1.2
24	1.9	2.2	1.7	3.1	2.3	4.7	2.2	1.6	2.3	1.0	.8	1.3
25	1.8	2.1	2.8	2.8	2.5	3.8	1.9	1.5	2.0	1.0	.7	1.3
26	1.8	2.0	3.2	2.5	2.3	3.5	1.9	1.4	1.7	1.0	.7	1.2
27	1.7	1.9	3.0	2.5	2.1	7.5	3.1	1.4	1.5	1.0	.7	1.2
28	1.6	1.7	2.7	3.1	1.9	6.8	3.1	1.5	1.4	.9	1.2	1.4
29	1.5	1.5	3.0	3.4	1.7	4.9	2.9	2.2	1.3	.9	1.2	1.6
30	1.4	1.4	3.2	5.5	.....	4.0	2.5	2.0	1.2	.9	1.2	1.4
31	1.3	.....	3.2	9.2	.....	3.6	.....	1.8	.....	.9	1.2	.....

MIAMI RIVER AT TADMOR, OHI.

LOCATION.—At the National Road bridge at Tadmor, Montgomery County, about 4¾ miles below the mouth of Honey Creek, which enters from the left.

DRAINAGE AREA.—1,130 square miles (determined by the Morgan Engineering Co.).

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1916.

GAGE.—Vertical staff in two sections; read by E. J. Shepard. Sea-level elevation of zero of gage, 763.68 feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge at gage or by wading.

CHANNEL AND CONTROL.—May shift slightly during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.4 feet at 7 a. m., January 2 (discharge, 17,300 second-feet); minimum stage, 1.6 feet at 7 a. m., September 4 (discharge, 82 second-feet).

Highest stage known, 25.4 feet, occurred March 25, 1913.

ICE.—Stage-discharge relation may be affected by ice for short periods during extremely cold weather.

DIVERSIONS.—None. All the water diverted into the Miami & Erie Canal is wasted into the river several miles above Tadmor.

ACCURACY.—Stage-discharge relation practically permanent; not seriously affected by ice during the year. Rating curve well defined between 99 and 11,000 second-feet and an extension beyond these limits. Gage read daily to tenths. Low-water readings subject to error as they do not check closely with hydrographer's readings. Daily discharge ascertained by applying daily gage heights to rating table. Results good except for periods of very low water.

COOPERATION.—Gage-height record furnished by the United States Weather Bureau. Results of discharge measurements furnished by the Miami Conservancy District.

Discharge measurements of Miami River at Tadmor, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 15	B. H. Petty	2.30	297	June 30	H. R. Daubenspeck	2.50	341
Dec. 6	do	2.50	335	July 24	do	2.10	196
Jan. 4	do	11.32	10,100	Aug. 31	G. N. Burrell	2.16	231
June 9	H. R. Daubenspeck	4.70	1,780	Sept. 6	H. R. Daubenspeck	5.65	2,620

Daily discharge, in second-feet, of Miami River at Tadmor, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,120	470	470	5,400	16,100	774	3,170	2,020	709	524	196	119
2	1,050	421	376	17,300	9,500	709	1,510	910	645	524	196	99
3	910	421	376	14,200	5,270	709	1,350	1,750	1,670	524	196	99
4	774	524	376	10,900	2,870	709	1,590	1,930	980	524	196	82
5	774	421	376	6,320	2,380	709	1,350	1,840	583	470	196	2,670
6	774	421	376	5,400	2,020	840	1,190	1,840	470	421	227	3,680
7	774	421	376	4,230	1,750	3,570	1,120	6,050	1,930	421	227	840
8	774	421	376	2,200	1,350	3,170	980	13,200	2,200	421	261	297
9	645	470	376	2,200	1,270	2,870	980	7,160	1,840	421	297	297
10	583	421	376	1,350	1,120	1,930	980	5,400	1,510	376	261	261
11	583	421	376	1,350	1,120	1,190	980	2,200	1,190	376	227	261
12	583	421	376	3,790	980	1,120	980	1,510	980	421	227	227
13	583	421	376	11,300	910	1,120	1,120	1,430	910	421	196	227
14	470	421	376	6,740	910	1,120	1,190	1,350	774	376	196	227
15	910	421	297	4,230	840	980	1,190	980	709	335	196	227
16	1,430	421	297	3,070	840	980	1,050	910	470	335	196	227
17	1,930	421	470	3,070	840	980	910	840	524	261	142	261
18	1,930	421	3,790	3,170	1,050	980	774	774	709	227	142	261
19	3,900	980	1,670	3,170	1,050	910	774	774	1,350	196	119	227
20	2,670	2,870	1,190	3,170	1,050	910	774	774	980	196	99	227
21	1,930	2,020	1,050	2,870	1,050	910	1,120	840	1,120	196	99	227
22	1,270	1,590	1,050	5,030	1,050	4,010	1,590	840	1,590	196	119	261
23	1,120	1,350	774	4,560	1,120	8,750	910	910	1,510	196	119	261
24	1,120	1,120	645	2,470	1,120	7,580	709	774	1,050	196	142	227
25	910	980	1,120	2,110	1,190	4,790	645	709	840	196	142	227
26	910	980	2,200	1,930	1,120	4,450	774	645	709	196	119	227
27	709	980	2,670	1,750	1,120	7,440	910	645	524	196	142	261
28	645	840	1,930	3,470	1,050	13,900	2,470	774	470	196	196	335
29	583	709	2,470	3,170	1,050	8,900	2,200	910	470	196	196	297
30	583	470	4,560	6,740	.....	6,050	2,200	840	524	196	142	376
31	583	.....	3,570	14,400	.....	5,030	.....	774	.....	196	119	.....

Monthly discharge of Miami River at Tadmor, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 1,130 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	3,900	470	1,080	0.956	1.10
November	2,870	421	756	.669	.75
December	4,560	297	1,130	1.00	1.15
January	17,300	1,350	5,190	4.59	5.29
February	16,100	840	2,180	1.93	2.08
March	13,900	709	3,160	2.80	3.23
April	3,170	645	1,250	1.11	1.24
May	13,200	645	2,010	1.78	2.05
June	2,200	470	998	.883	.99
July	524	196	320	.283	.33
August	297	99	178	.158	.18
September	3,680	82	450	.398	.44
The year	17,300	82	1,560	1.38	18.83

MIAMI RIVER AT DAYTON, OHIO.

LOCATION.—At Main Street Bridge, Dayton, Montgomery County, about half a mile below mouth of Mad River and 1 mile above mouth of Wolf Creek.

DRAINAGE AREA.—2,520 square miles (determined by Miami Conservancy District).

RECORDS AVAILABLE.—March 18, 1905, to December 31, 1909; April 1, 1913, to September 30, 1916.

GAGE.—Vertical staff attached to downstream end of first pier from left bank; read by C. E. Wilson. Sea-level elevation of zero of gage, 723.73 feet.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Control apparently shifts considerably at high stages and not so much at low stages. Weeds in the channel sometimes affect stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.8 feet at midnight January 31 (discharge, 48,200 second-feet); minimum stage, 0.7 foot July 30, 31, and August 22–27 (discharge, 345 second-feet).

The flood of March–April, 1913, reached a stage of 29.0 feet on March 26, as determined by the Miami Conservancy District.

ICE.—Ice may affect the stage-discharge relation during extremely cold weather.

DIVERSIONS.—A power plant about a mile above the station may divert water around the section, and a dam on Mad River about 2 miles above the station diverts water into the Miami & Erie Canal. Water, about 110 second-feet, diverted from river past gage not included in daily discharge.

ACCURACY.—Stage-discharge relation changed during high water of January, 1916. Rating curve used before January 1, 1916, well defined between 250 and 300 second-feet and fairly well defined at higher stages; curve used after February 1, 1916, fairly well defined; January 1–31, discharge determined by indirect method for shifting control. Gage read daily to tenths. Daily discharge ascertained by applying mean daily gage heights to rating table except for the period January 1–31, when stage-discharge relation was affected by shifting control. Results obtained by use of rating table good except for low stages, where lack of refinemen. in gage readings may cause some error; those obtained by methods for shifting control fair.

COOPERATION.—Gage-height record furnished by the United States Weather Bureaut Results of discharge measurements furnished by the Miami Conservancy District.

Discharge measurements of Miami River at Dayton, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 7	B. H. Petty	1.65	901	May 8	B. H. Petty	10.35	29,000
Jan. 2	Petty and Watson	13.95	43,700	June 7	G. N. Burrell	4.95	6,370
3	Houk and Lane	11.5	31,400	July 1	do	2.00	1,290
4	Houk and McBride	8.2	17,400	Aug. 3	do	0.90	458
Feb. 1	H. R. Daubenspeck	13.65	46,500	Sept. 19	do	0.90	426

Discharge measurements of Miami and Erie Canal at Warren Street Bridge, Dayton, Ohio, during the years ending Sept. 30, 1914–16.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1914–15.		*Feet.*	*Sec.-ft.*
Feb. 25	B. H. Petty		[a] 149	Apr. 3	H. R. Daubenspeck		88.3
Mar. 4	I. E. Houk		[a] 165	Sept. 18	B. H. Petty		120
Apr. 18	H. R. Daubenspeck		[a] 111				
May 2	do		[a] 114	1915–16.			
2	do		[a] 119	Dec. 7	B. H. Petty		105
June 8	do		[a] 141	Mar. 23	H. R. Daubenspeck		92.5
Aug. 27	do		121	May 19	G. N. Burrell		121
				June 30	do		121
1914–15.				Aug. 7	H. R. Daubenspeck		112
Oct. 6	H. R. Daubenspeck		121	Sept. 15	do		107
Nov. 14	H. R. Daubenspeck and E. W. Lane		119				

[a] Jefferson Street Bridge.

Daily discharge, in second-feet, of Miami River at Dayton, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,050	1,060	1,240	9,050	50,300	1,970	6,470	2,440	1,970	1,100	1,010	440
2	2,050	965	1,140	36,900	21,000	2,080	4,630	2,080	1,570	1,100	500	390
3	1,940	965	1,060	39,500	12,200	1,670	3,690	1,970	7,280	1,100	440	390
4	1,720	965	965	19,300	6,470	1,470	3,280	3,090	3,090	1,010	500	390
5	2,290	875	965	11,900	4,880	1,670	2,910	2,740	2,080	930	630	390
6	1,830	790	875	9,300	4,140	1,470	2,580	2,310	1,970	850	630	1,190
7	1,420	710	875	7,600	3,480	3,910	2,310	7,830	5,930	775	565	1,570
8	1,420	635	965	5,300	2,440	8,110	2,190	32,600	7,280	775	775	775
9	1,330	565	965	4,380	2,440	5,400	2,190	12,900	4,880	775	930	630
10	1,240	565	965	3,280	2,310	3,690	2,440	6,740	3,910	700	700	565
11	1,140	565	965	4,140	2,310	2,910	3,280	4,880	4,380	700	700	440
12	1,060	635	965	9,300	2,310	2,580	3,090	3,480	3,090	630	700	440
13	1,060	710	875	26,400	3,910	2,310	2,580	2,580	2,310	630	630	390
14	1,140	710	875	18,100	3,090	2,190	2,440	2,310	2,080	630	565	390
15	1,240	710	875	8,500	2,440	2,190	2,190	2,080	1,870	565	500	390
16	2,050	710	875	6,100	2,440	2,190	2,080	1,970	1,670	565	500	390
17	1,720	710	1,140	4,140	2,440	2,080	2,080	1,870	1,570	565	440	4:0
18	1,620	710	5,890	3,480	2,580	1,970	1,870	1,770	1,770	500	440	390
19	7,540	1,830	5,050	3,280	2,910	1,970	1,870	1,670	2,910	500	440	390
20	5,250	6,340	3,900	2,440	2,740	1,870	1,670	1,470	2,310	500	390	440
21	3,720	4,650	2,050	3,690	2,440	1,970	1,570	1,370	2,580	1,470	390	440
22	2,560	3,370	2,050	8,200	2,310	4,880	6,470	1,280	4,380	930	345	440
23	2,170	2,560	875	9,050	2,310	17,900	5,400	1,870	4,140	850	345	440
24	1,830	2,170	790	6,100	3,090	11,500	3,280	1,770	2,910	775	345	440
25	1,620	2,050	1,720	4,380	3,480	7,550	2,310	1,470	2,190	775	345	440
26	1,520	1,830	7,050	3,690	2,910	6,470	2,190	2,190	1,870	630	345	440
27	1,420	1,830	4,850	3,280	2,740	19,200	2,910	1,370	1,570	500	345	440
28	1,240	1,830	3,540	5,300	2,440	35,400	4,630	1,670	1,280	440	500	500
29	1,240	1,620	5,460	8,760	2,190	17,000	4,140	2,190	1,190	390	390	700
30	1,240	1,330	8,560	16,600	.....	10,500	3,280	2,580	1,100	345	390	565
31	1,140	.....	6,810	38,900	.....	7,010	.....	2,190	.....	345	440	.....

NOTE.—Water diverted past gage not included in daily discharge.

Monthly discharge of Miami River at Dayton, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 2,520 square miles.]

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
October	7,540	1,060	1,960
November	6,340	565	1,500
December	8,560	790	2,430
January	39,500	2,440	11,000
February	50,300	2,190	5,540
March	35,400	1,470	6,230
April	6,470	1,570	3,070
May	32,600	1,280	3,830
June	7,280	1,100	2,900
July	1,470	345	721
August	1,010	345	521
September	1,570	390	522
The year	50,300	345	3,350

MIAMI RIVER AT FRANKLIN, OHIO.

LOCATION.—In NW. ¼ sec. 3, T. 1 N., R. 5 E., at suspension bridge on Second Street at Franklin, Warren County; Twin Creek enters about 2¾ miles downstream.

DRAINAGE AREA.—2,780 square miles (Miami Conservancy District).

RECORDS AVAILABLE.—March 15 to September 30, 1916.

GAGE.—Vertical staff in two sections. Lower section reading 0–12.45 feet bolted to downstream side of old stone abutment on east side of river. Upper section nailed to south side of telephone pole 25 feet below east end of bridge. Read by Mrs. John Coleman. Sea-level elevation of zero of gage 658.41 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of suspension bridge. Current very sluggish at low stages and low water measurements are liable to error on that account.

CHANNEL AND CONTROL.—The principal control consists of a boulder and gravel bar half a mile below the gage, free from vegetation and apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.4 feet at 7 a. m., March 28 (discharge, 37,600 second-feet); minimum stage, 1.1 feet at 10 a. m., August 29 (discharge, 545 second-feet).

Highest stage known 23.0 feet on March 26, 1913.

ICE.—Stage-discharge relation affected by ice only during very cold weather.

REGULATION.—See under Diversions.

DIVERSIONS.—Some water is diverted from the river 2 miles above the gage but it is returned to the river about 800 feet above the station. There is little or no flow in the Miami & Erie Canal.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the period of record. Rating curve well defined. Gage read to tenth once daily. Daily discharge ascertained by applying mean daily gage height to rating table. Results excellent.

COOPERATION.—Base data furnished by Miami Conservancy District.

Discharge measurements of Miami River at Franklin, Ohio, from Mar. 28 to Aug. 29, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 28	H. R. Daubenspeck	13.2	36,600	Apr. 14	H. R. Daubenspeck	3.15	3,050
Mar. 29	do	9.35	21,000	May 25	G. N. Burrell	2.3	1,800
Do	do	8.6	17,800	June 28	C. O. Shively and G. N. Burrell	2.20	1,570
Mar. 30	do	6.95	12,400				
Do	do	6.6	11,100	July 20	G. N. Burrell	1.68	1,060
Mar. 31	do	5.75	8,720	Aug. 29	H. R. Daubenspeck	1.10	546
Apr. 1	do	5.08	6,820				

Daily discharge, in second-feet, of Miami River at Franklin, Ohio, for the year ending Sept. 30, 1916.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	6,740	2,830	2,500	1,890	1,160	860
2	.....	7,950	2,830	1,890	1,890	1,060	860
3	.....	4,630	2,830	15,100	1,380	1,060	860
4	.....	5,030	2,830	4,630	1,270	1,060	860
5	.....	3,880	3,700	3,340	1,270	960	860
6	.....	3,340	2,830	3,520	1,270	960	2,040
7	.....	2,830	6,740	6,990	1,160	960	860
8	.....	2,830	34,500	8,230	1,160	960	1,890
9	.....	2,830	17,200	6,250	1,060	960	1,890
10	.....	2,830	8,230	4,630	960	960	1,750
11	.....	2,830	5,790	5,030	960	960	1,380
12	.....	4,250	4,630	4,250	960	1,160	1,160
13	.....	3,700	3,700	3,700	860	1,060	1,060
14	.....	3,700	3,340	3,170	960	960	1,060
15	.....	2,830	2,830	2,830	960	960	960
16	2,830	2,830	2,830	2,830	960	960	960
17	2,660	2,830	4,630	2,830	1,160	860	960
18	2,340	2,500	2,830	2,830	960	860	960
19	2,340	1,620	2,830	3,520	860	960	860
20	2,340	2,040	2,830	3,170	1,160	960	860
21	2,340	2,830	2,830	2,830	1,890	960	860
22	3,700	6,740	2,500	4,250	1,380	960	770
23	18,300	5,570	2,830	3,700	1,160	960	770
24	13,400	4,250	2,830	3,520	1,060	960	770
25	9,550	3,700	2,830	3,340	960	860	770
26	7,410	2,830	1,750	2,830	960	860	770
27	18,600	3,700	1,750	2,340	960	860	770
28	37,600	5,570	1,890	1,750	860	860	770
29	22,100	4,630	2,340	1,380	860	860	960
30	12,500	4,250	3,700	1,270	860	860	960
31	9,270	.....	2,830	.....	860	860	.....

Monthly discharge of Miami River at Franklin, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 2,780 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1916.					
March 16–31	37,600	2,340	10,500	3.78	2.25
April	7,950	1,620	3,870	1.39	1.55
May	34,500	1,750	4,800	1.73	1.99
June	15,100	1,270	3,950	1.42	1.58
July	1,890	860	1,130	.406	.47
August	1,160	860	957	.344	.40
September	2,040	770	1,040	.374	.42

MIAMI RIVER AT HAMILTON, OHIO.

LOCATION.—At single-span highway bridge on Hight Street at Hamilton, Butler County.

DRAINAGE AREA.—3,580 square miles.

RECORDS AVAILABLE.—February 28, 1910, to September 30, 1916. Flood stages only, November 16, 1904, to February 27, 1910, reported by United States Weather Bureau.

GAGE.—Vertical staff attached to pile about 75 feet above High-Main Street bridge, reading from 0 to 10 feet. Staff fastened to oak sleeper in the left concrete river wall just above the new bridge reads from 10 feet to 27 feet. Zero of gage, 564.63 feet above sea level. For description of old gage, see Water-Supply Paper 353.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Apparently permanent under ordinary conditions. The section at the bridge shifts somewhat during floods on account of the high velocity.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.5 feet at 7 a. m. February 1 (discharge, 55,000 second-feet); minimum stage, 2.0 feet September 17–20 (discharge, 360 second-feet).

The maximum stage on record at this station occurred at 3 a. m. March 26, 1913, at gage height 34.6 feet. According to records of United States Weather Bureau, the highest stage prior to 1913 was 21.2 feet March 24, 1898.

ICE.—Stage-discharge relation affected by ice for short periods during severe weather, but factory wastes probably keep temperature of water above freezing point.

DIVERSIONS.—The Miami & Erie Canal is fed by water taken from Miami River at Middletown. The quantity diverted is about 120 second-feet, as shown by discharge measurements made during the summer of 1916. Water diverted past gage not included in table of daily discharge.

REGULATION.—There are several power plants in Hamilton above the station, but all the water is returned to the river above the gage.

ACCURACY.—Stage-discharge relation practically permanent; ice reported January 17–19, but did not seriously affect stage-discharge relation. Rating curve well defined above 430 second-feet. Gage read to half tenths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Results excellent. Stage-discharge relation was materially changed by the flood of March-April, 1913, and as no discharge measurements were made after this flood until June 6, 1914, estimates of discharge from April 22, 1913, to May, 1914, may not be so accurate as those subsequent to this period. January 18, 1916, no gage height reported; discharge interpolated.

COOPERATION.—Results of discharge measurements furnished by Miami Conservancy District.

Discharge measurements of Miami River at Hamilton, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 17	B. H. Petty	2.59	883	Feb. 1	B. H. Petty	14.52	50,600
Jan. 3	do	13.40	44,300	July 6	G. N. Burrell	2.70	1,410
12	E. W. Lane	9.39	24,700	24	do	2.64	1,270
15	H. R. Daubenspeck	6.42	13,000	Aug. 31	H. R. Daubenspeck	2.17	655

Discharge measurements of Miami and Erie Canal at High Street Bridge, Hamilton, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 18	H. R. Daubenspeck	.....	121	July 24	G. N. Burrell	.....	120
May 4	do	.....	121	Aug. 31	H. R. Daubenspeck	.....	123
July 6	G. N. Burrell	.....	117				

Daily discharge, in second-feet, of Miami River at Hamilton, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,200	1,390	2,080	19,400	50,500	3,840	8,780	4,620	4,090	2,220	900	700
2	4,200	1,300	1,850	33,200	31,700	3,590	7,650	4,350	3,840	2,220	830	700
3	3,900	1,300	1,650	43,700	14,600	3,340	6,910	4,090	14,200	2,220	830	700
4	3,600	1,300	1,480	27,500	9,520	3,100	6,910	3,840	6,200	2,020	830	700
5	4,200	1,150	1,300	16,600	7,650	3,100	6,550	4,350	4,350	1,820	830	700
6	3,600	1,150	1,300	12,200	6,910	2,870	6,200	4,090	7,650	1,630	1,120	3,840
7	3,050	1,150	1,300	9,900	5,520	9,150	5,850	14,600	17,000	1,450	1,120	2,760
8	2,550	1,150	1,300	7,650	4,910	11,000	5,850	28,400	11,400	1,450	1,200	1,450
9	2,300	1,000	1,300	6,200	4,910	8,020	5,520	17,000	8,400	1,360	2,020	1,040
10	2,080	1,000	1,300	5,500	4,620	5,850	4,910	9,520	6,910	1,280	1,450	970
11	1,850	1,000	1,300	8,400	4,350	4,910	5,520	7,280	7,650	1,120	1,280	830
12	1,650	1,000	1,300	27,500	8,400	4,350	4,910	6,910	5,520	1,120	1,120	700
13	1,650	1,000	1,300	38,900	6,550	4,090	4,910	6,200	4,620	1,280	1,360	700
14	1,650	1,000	1,300	26,600	5,520	4,090	4,350	5,210	4,350	1,120	1,120	700
15	1,650	850	1,300	12,200	4,910	4,090	4,350	4,350	4,090	1,120	1,120	700
16	1,650	850	1,300	8,780	4,910	4,090	4,350	3,840	3,840	1,120	970	580
17	1,650	850	9,900	6,900	4,620	3,840	4,090	3,590	4,350	1,120	970	470
18	4,200	850	9,900	5,200	5,520	3,590	4,090	3,340	4,350	1,120	830	470
19	8,400	7,650	8,020	3,600	5,520	3,590	3,840	3,100	4,620	970	830	470
20	7,650	8,400	4,800	7,650	4,910	3,590	3,840	2,870	4,620	1,630	830	470
21	6,200	6,900	3,600	8,400	4,620	3,590	5,210	2,650	5,210	1,450	830	700
22	5,150	4,800	3,050	15,400	4,350	8,400	8,400	2,440	5,850	1,630	830	700
23	3,900	3,900	2,550	12,600	4,350	17,800	6,200	2,440	5,520	1,450	830	700
24	3,050	3,050	2,550	9,150	4,910	13,800	4,910	2,220	4,350	1,450	830	700
25	2,680	2,800	5,500	7,650	5,520	9,900	4,350	2,220	3,840	1,280	830	700
26	2,420	2,550	9,520	6,900	4,910	9,520	4,350	2,020	3,340	1,120	700	700
27	2,080	2,550	7,650	6,900	4,350	25,700	4,620	2,020	2,870	1,120	700	700
28	1,850	2,550	6,900	9,520	4,350	36,000	4,620	2,220	2,440	1,120	700	700
29	1,650	2,300	14,600	23,000	4,090	23,000	5,520	2,220	2,440	1,120	700	1,120
30	1,650	2,300	15,000	33,200	.....	14,600	4,910	4,910	2,440	970	700	970
31	1,480	.....	12,200	48,100	.....	10,600	.....	4,350	.....	970	700	.....

NOTE.—Water diverted from river not included in daily discharge.

Monthly discharge of Miami River at Hamilton, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 3,580 square miles.]

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
October	8,400	1,480	3,150
November	8,400	850	2,300
December	15,000	1,300	4,460
January	48,100	3,600	16,400
February	50,500	4,090	8,190
March	36,000	2,870	8,610
April	8,780	3,840	5,420
May	28,400	2,020	5,520
June	17,000	2,440	5,680
July	2,220	970	1,390
August	2,020	700	965
September	3,840	470	911
The year	50,500	470	5,250

MIAMI RIVER AT VENICE, OHIO.

LOCATION.—About 400 feet downstream from boundary line between Hamilton and Butler counties, at the single-span highway bridge, three-fourths mile southeast of Venice, Butler County. Indian Creek enters from the right about 1.4 miles above the station.

DRAINAGE AREA.—3,790 square miles (measured by United States Army Engineers).

RECORDS AVAILABLE.—June 14, 1915, to September 30, 1916.

GAGE.—Chain gage fastened to downstream side of bridge; read by H. B. Matson.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—The control for medium stages is the remains of an old milldam about 1¼ miles below the gage. For stages below about 3 feet a riffle is formed by an unstable gravel bar under the bridge. This bar scours out during high water and reforms at low stages. All water flows under the bridge for stages less than 25 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records: 23.1 feet, February 1, 1916 (discharge, 52,300 second-feet); minimum stage, 1.31 feet, September 5, 1916 (discharge, 546 second-feet).

The highest stage known corresponds to about 38 feet on the gage.

DIVERSIONS.—The Miami & Erie Canal is fed by water taken from Miami River at Middletown. The canal at Lindenwald near the point where it leaves the watershed has a flow of about 120 second-feet, which is a considerable part of the low-water flow of the Miami River. Water diverted from river past gage not included in table of daily discharge.

REGULATION.—The flow during low stages is probably regulated to a large extent by the hydraulic canal in Hamilton.

ACCURACY.—Stage-discharge relation practically permanent except for possible slight changes at low stage because of shifts in the gravel bar at the bridge; not affected by ice during the year. Rating curve well defined between 600 and 40,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Gage-height record, results of discharge measurements, and data for station description furnished by United States Army Engineers.

Discharge measurements of Miami River at Venice, Ohio, during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914–15.		*Feet.*	*Sec.-ft.*	1914–15.		*Feet.*	*Sec.-ft.*
June 14	Crosley and Daubenspeck	2.62	1,570	Sept. 1	L. M. Crosley	3.16	2,060
July 6	L. M. Crosley	4.09	3,200	14	do	3.97	2,760
8	do	14.20	25,800	15	do	3.62	2,580
8	do	15.25	28,700	17	do	3.25	2,050
8	do	15.57	29,800	1915–16.			
8	do	15.66	29,100	Nov. 4	do	2.66	1,410
8	do	15.57	29,200	Jan. 4	do	17.15	29,100
9	do	14.78	25,800	4	do	15.42	23,600
9	do	14.73	26,900	5	do	11.49	14,300
9	do	14.73	27,000	Mar. 29	do	14.23	25,600
9	do	14.75	26,400	29	do	13.46	23,300
12	Crosley and Daubenspeck	6.95	7,520	30	do	10.63	15,900
13	do	5.87	5,510	30	do	10.18	14,900
14	do	5.10	4,610	31	do	8.88	11,300
15	do	4.45	3,680	31	do	8.71	10,800
				Sept. 16	do	1.54	713

NOTE.—Results of measurements on Jan. 4 and 5, 1916, are probably much too low because of using area computed from cross section of stream determined at time of measurement on Nov. 4, 1915. Soundings taken on Mar. 31, 1916, indicate a material shift in the section.

Daily discharge, in second-feet, of Miami River at Venice, Ohio, for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					1915.				
1	.....	2,330	2,570	2,000	16	4,710	7,620	2,950	2,220
2	.....	2,000	2,000	1,800	17	3,490	10,600	2,570	2,110
3	.....	3,780	2,110	1,700	18	2,110	8,340	2,330	2,000
4	.....	2,690	3,490	1,610	19	3,210	9,070	2,220	4,080
5	.....	3,210	3,350	7,080	20	5,360	10,400	2,220	3,640
6	.....	3,640	3,640	8,160	21	3,930	9,810	10,800	3,080
7	.....	2,450	2,450	7,980	22	2,950	11,000	11,400	2,450
8	.....	26,300	2,000	7,620	23	2,450	7,440	8,880	2,000
9	.....	26,900	3,780	6,900	24	1,900	7,080	7,080	2,000
10	.....	18,100	2,220	9,620	25	1,610	4,390	6,900	1,800
11	.....	11,000	2,220	7,260	26	2,450	3,490	5,690	1,700
12	.....	7,800	6,720	5,030	27	1,260	2,950	3,780	6,030
13	.....	6,030	4,390	3,490	28	1,260	2,570	3,210	7,260
14	1,570	4,710	7,080	2,450	29	1,260	4,390	2,450	7,080
15	1,900	3,780	3,930	2,450	30	2,000	2,330	2,690	4,710
					31	.....	1,110	2,220	.....

Daily discharge, in second-feet, of Miami River at Venice, Ohio, for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	4,710	1,700	2,120	20,700	51,300	3,930	9,620	4,390	2,950	2,110	865	765
2	4,080	1,660	1,900	34,000	37,100	3,640	7,980	3,780	2,450	2,000	900	798
3	3,490	1,610	1,900	41,400	15,200	3,490	6,900	3,640	12,800	1,800	865	735
4	3,080	1,520	1,800	31,600	10,800	3,350	6,200	4,080	7,440	1,610	830	595
5	4,390	1,430	1,700	17,000	8,340	3,210	5,690	4,710	4,710	1,520	865	622
6	3,210	1,430	1,610	12,800	7,980	3,490	5,030	3,780	6,900	1,430	1,040	3,350
7	2,690	1,430	1,610	11,400	6,900	10,000	4,710	8,160	16,000	1,340	970	3,350
8	2,220	1,260	1,610	8,340	9,620	11,200	4,550	25,400	10,400	1,340	1,290	1,700
9	2,220	1,260	1,610	6,900	5,360	8,700	4,550	18,900	8,700	1,260	1,610	1,110
10	2,000	1,260	1,610	6,200	5,190	7,080	4,870	10,200	7,620	1,260	1,800	970
11	1,900	1,260	1,520	9,260	4,870	6,200	5,190	7,440	7,440	1,180	1,260	830
12	1,700	1,340	1,520	30,200	10,400	5,360	5,690	6,200	6,030	1,260	1,180	798
13	1,800	1,430	1,430	39,900	8,520	4,870	5,030	4,870	4,710	1,180	1,260	735
14	1,700	1,700	1,430	29,600	7,080	4,710	4,550	3,930	3,930	1,180	1,260	735
15	2,110	1,260	1,340	13,700	5,860	4,870	4,080	3,490	3,350	1,180	1,040	735
16	2,450	1,260	1,340	9,810	5,520	4,390	3,780	3,350	3,490	1,110	900	705
17	2,820	1,260	11,600	7,260	5,860	4,080	3,490	3,080	4,240	1,110	830	678
18	2,950	1,260	10,600	5,690	7,080	3,930	3,350	2,820	3,490	1,110	830	678
19	8,880	7,800	8,880	4,710	6,380	4,080	2,950	2,450	4,080	1,040	830	705
20	8,160	8,520	6,030	7,080	5,860	3,930	2,820	2,330	4,080	2,110	830	705
21	6,380	7,620	3,490	9,070	5,690	4,080	3,490	5,190	5,690	1,430	765	705
22	4,710	7,080	2,690	15,500	5,190	6,900	8,700	2,450	6,030	1,700	765	735
23	3,780	4,390	2,820	13,700	5,690	16,500	7,260	2,950	6,380	1,340	798	705
24	3,210	3,780	2,820	9,810	6,200	14,200	5,690	2,690	4,870	1,260	735	678
25	2,450	3,350	4,240	8,160	7,080	10,600	4,960	2,330	3,780	1,180	678	650
26	2,570	2,950	8,880	7,260	6,030	9,626	4,240	2,220	3,080	1,040	678	678
27	2,220	2,820	8,340	6,900	5,360	23,700	4,710	2,220	2,690	1,040	650	678
28	2,110	2,820	7,080	9,260	4,390	34,400	6,900	2,220	2,330	1,040	650	798
29	2,000	2,570	13,700	22,300	4,240	25,200	6,030	2,950	2,110	970	765	1,110
30	1,900	2,330	14,700	31,000	.....	15,500	5,360	6,380	1,900	900	705	1,040
31	1,800	.....	13,000	43,000	.....	11,400	.....	4,080	.....	865	735	.....

NOTE.—Discharge interpolated Nov. 2 and Dec. 1, 1915, Apr. 25 and Aug. 8, 1916. Water diverted from river not included in daily discharge.

Monthly discharge of Miami River at Venice, Ohio.

[Drainage area, 3,790 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
June 14-30	5,360	1,260	2,550	0.673	0.42
July	26,900	1,110	7,330	1.93	2.22
August	11,400	2,000	4,170	1.10	1.27
September	9,620	1,610	4,240	1.12	1.25
The period June 14 to Sept. 30	26,900	1,110	4,840	1.28	5.16
1915-1916.					
October	8,880	1,700	3,220	.850	.98
November	8,520	1,260	2,710	.715	.80
December	14,700	1,340	4,670	1.23	1.42
January	43,000	4,710	16,900	4.46	5.14
February	51,300	4,240	9,490	2.50	2.70
March	34,400	3,210	8,920	2.35	2.71
April	9,620	2,820	5,280	1.39	1.55
May	25,400	2,220	5,250	1.39	1.60
June	16,000	1,900	5,460	1.44	1.61
July	2,110	865	1,320	.348	.40
August	1,800	650	941	.248	.29
September	3,350	595	969	.256	.29
The year	51,300	595	5,420	1.43	19.49

LORAMIE CREEK AT LOCKINGTON, OHIO.

LOCATION.—In the NE. ¼ sec. 30, T. 7 N., R. 6 E., at steel highway bridge half a mile northwest of Lockington, Shelby County, and 1½ miles below the mouth of Turtle Creek.

DRAINAGE AREA.—255 square miles. (Miami Conservancy District.)

RECORDS AVAILABLE.—September 13, 1915, to September 30, 1916.

GAGE.—Vertical staff in two sections. Lower section reading 0–10.45 feet bolted to downstream face of pier. Upper section fastened to a tree 100 feet southwest of west end of bridge. Read by Vernon Jones. Sea-level elevation of zero of gage, 875.99 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—The principal control is a sand and gravel bar about 100 feet below the gage and is liable to shift. During summer months it is affected somewhat by a growth of vegetation along the edge of the stream.

EXTREMES OF STAGE.—Maximum stage recorded during the year 10.4 feet at 4.30 a. m. May 7; minimum stage, 1.0 foot at 7 a. m. November 18.

Highest stage known, 15.6 feet on March 25, 1913.

ICE.—The creek is frozen over during very cold weather.

DIVERSIONS.—The summit level of the Miami and Erie Canal is supplied by water from the Loramie reservoir, consequently water is diverted from Loramie Creek to Lake Erie drainage. There is no flow in the Miami and Erie Canal at Lockington as the 1913 flood destroyed the canal embankment at a number of places and no repairs have been made.

REGULATION.—There is a small amount of regulation due to operation of the State reservoir at Fort Loramie, which controls about 30 per cent of the total drainage area.

ACCURACY.—Stage-discharge relation not permanent; not seriously affected by ice during the year. Rating curve not developed. Measurements indicate considerable change in the control. Gage read to tenths once daily.

COOPERATION.—Base data furnished by Miami Conservancy District.

Discharge measurements of Loramie Creek at Lockington, Ohio, during the years ended Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1915-16.		*Feet.*	*Sec.-ft.*
Sept. 14	B. H. Petty	1.70	50.8	Nov. 23	B. H. Petty	2.30	296
Sept. 27	I. E. Houk	4.80	2,000	Apr. 14	do	1.65	86.3
Do	do	4.88	2,010	May 31	G. N. Burrell	1.50	63.9
Sept. 28	do	3.08	647	June 26	H. R. Daubenspeck	1.50	79.5
Do	do	3.00	598	July 26	do	1.60	13.3
Sept. 29	do	2.38	258	Sept. 12	G. N. Burrell	1.30	12.3

Daily gage height, in feet, of Loramie Creek at Lockington, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.8	1.5	1.8	3.8	6.5	2.0	2.7	2.6	1.5	1.5	1.3	1.2
2	1.8	1.5	1.8	8.2	4.3	1.8	2.4	2.5	1.4	1.4	1.3	1.2
3	1.8	1.5	1.7	6.7	3.5	1.8	2.1	2.8	1.4	1.4	1.3	1.2
4	1.8	1.4	1.7	5.2	3.4	1.7	1.8	2.5	1.4	1.4	1.3	1.2
5	1.7	1.4	1.7	3.8	3.0	1.7	1.7	2.0	1.5	1.3	1.3	1.2
6	1.7	1.3	1.7	4.0	2.6	1.7	1.6	1.7	1.7	1.3	1.3	4.0
7	1.6	1.3	1.7	3.4	2.1	3.5	1.5	10.4	1.9	1.3	1.3	2.5
8	1.6	1.3	1.6	3.2	2.4	3.0	1.5	6.0	2.0	1.3	1.3	1.8
9	1.5	1.2	1.6	2.8	2.3	2.5	1.9	4.5	2.1	1.3	1.3	1.6
10	1.4	1.2	1.6	2.3	2.1	2.2	1.9	3.7	2.1	1.3	1.3	1.5
11	1.4	1.2	1.5	2.5	2.1	2.0	1.9	3.2	2.0	1.3	1.3	1.4
12	1.5	1.2	1.5	3.9	2.1	2.0	1.9	2.7	1.7	1.3	1.3	1.4
13	1.5	1.1	1.5	5.5	2.0	1.9	1.8	2.0	1.7	1.3	1.3	1.4
14	1.8	1.1	1.5	4.8	2.0	1.9	1.8	1.6	1.6	1.3	1.3	1.4
15	2.3	1.1	1.4	4.3	2.0	1.8	1.8	1.5	1.5	1.3	1.3	1.4
16	2.0	1.1	1.4	4.0	1.9	1.8	1.7	1.5	1.4	1.3	1.3	1.4
17	1.8	1.1	1.8	3.9	1.9	2.0	1.7	1.5	1.4	1.3	1.3	1.4
18	2.2	1.0	3.4	3.7	1.8	2.2	1.6	1.5	1.4	1.3	1.3	1.4
19	2.8	3.5	2.5	3.3	1.8	2.2	1.5	1.5	1.6	1.4	1.3	1.4
20	2.3	3.4	2.2	2.9	1.8	2.1	1.5	1.4	1.6	1.6	1.3	1.4
21	1.9	2.7	2.1	2.7	1.8	2.1	4.1	1.4	1.8	1.7	1.3	1.4
22	1.7	2.5	1.8	3.7	1.8	5.6	3.2	1.4	3.3	1.5	1.3	1.4
23	1.6	2.4	1.6	2.8	1.9	5.0	3.0	1.4	2.8	1.4	1.2	1.3
24	1.8	2.4	1.8	2.5	2.2	4.0	3.0	1.4	2.0	1.4	1.2	1.3
25	1.7	2.3	3.1	2.3	2.3	3.8	2.0	1.4	1.8	1.3	1.2	1.3
26	1.7	2.2	3.1	2.3	2.5	3.7	2.8	1.4	1.8	1.3	1.2	1.3
27	1.7	2.2	2.8	2.7	2.3	6.8	3.0	1.4	1.7	1.3	1.2	1.3
28	1.5	2.0	2.7	3.0	2.1	5.0	3.0	1.3	1.7	1.3	1.2	1.3
29	1.5	1.9	2.9	3.1	2.0	3.9	3.0	1.3	1.6	1.3	1.2	1.4
30	1.5	1.8	3.3	5.0	.....	3.5	2.8	1.3	1.5	1.3	1.2	1.4
31	1.5	.....	2.9	8.2	.....	3.0	.....	1.5	.....	1.3	1.2	.....

STILLWATER RIVER NEAR WEST MILTON, OHIO.

LOCATION.—In the SE. ¼ sec. 4, T. 4 N., R. 5 E., 1 mile below the mouth of Ludlow Creek, entering from the right, at the bridge of the Cleveland, Cincinnati, Chicago & St. Louis Railway (Peoria & Eastern division), about 2 miles north of West Milton, Miami County.

DRAINAGE AREA.—600 square miles.

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1916.

GAGE.—Vertical staff in two sections; read by M. J. Shellhaas. Sea-level elevation of zero of gage, 812.97 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of railroad bridge at gage, from upstream side of highway bridge about 300 feet below the gage, or by wading.

CHANNEL AND CONTROL.—Regular section shifts slightly during high water; weeds during the summer may affect stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.4 feet at 3 p. m. January 31 (discharge, 23,700 second-feet); minimum stage, 0.4 foot at 7 a. m. December 15 and 16 (discharge, 21 second-feet).

The flood of March-April, 1913, reached a stage of 28 feet on March 25.

ICE.—Stage-discharge relation affected by ice during severe weather.

ACCURACY.—Stage-discharge relation changed during high water the last of January, 1916. Rating curve used to and including January 31, fairly well defined; curve used after that date well defined above 34 second-feet. Stage-discharge relation not seriously affected by ice. Gage read daily to tenths. Daily discharge ascertained by applying daily gage heights to rating table. Results good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau. Results of discharge measurements furnished by the Miami Conservancy District.

Discharge measurements of Stillwater River near West Milton, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 16	B. H. Petty	1.20	124	July 5	H. R. Daubenspeck	1.10	130
Jan. 31	E. A. Gift and H. R. Daubenspeck	15.4	21,600	31	G. N. Burrell	.65	43.4
June 8	G. N. Burrell	3.45	1,440	Aug. 30	do	.65	42.2

Daily discharge, in second-feet, of Stillwater River near West Milton, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	478	160	187	3,100	11,400	307	815	555	233	175	70	43
2	650	160	160	13,800	7,840	268	680	500	233	150	70	55
3	378	136	114	11,400	4,500	233	615	352	400	150	55	55
4	378	160	114	3,100	3,780	202	500	1,050	352	150	43	43
5	333	160	94	980	2,000	175	500	745	307	127	43	43
6	292	187	114	980	1,050	175	450	555	268	106	43	106
7	292	136	76	1,060	680	2,000	450	4,970	1,590	87	34	127
8	218	136	76	980	400	1,690	400	5,130	1,500	70	150	87
9	187	114	61	910	307	745	450	2,000	1,690	70	127	70
10	160	94	48	910	233	680	450	970	680	55	175	70
11	76	76	39	650	202	555	450	680	680	70	127	70
12	136	94	48	2,230	233	450	352	500	615	70	87	70
13	136	76	32	6,140	268	400	352	500	352	70	70	55
14	187	94	26	2,470	202	400	352	555	307	70	70	55
15	378	76	21	1,900	400	450	352	500	307	70	55	55
16	333	76	21	980	745	352	352	450	352	70	55	43
17	254	94	76	333	745	352	352	400	400	55	55	43
18	980	94	2,010	292	680	352	307	307	400	55	43	43
19	3,100	533	980	650	615	307	307	268	352	55	43	43
20	980	1,900	378	650	555	307	307	268	352	87	55	43
21	780	980	478	533	450	352	2,540	233	615	202	55	43
22	650	910	378	980	450	2,870	2,540	202	1,400	175	43	43
23	590	910	333	650	400	3,360	1,500	268	745	175	43	34
24	378	650	292	590	450	1,590	815	233	680	150	43	34
25	378	478	2,010	533	555	1,220	555	233	615	106	34	34
26	333	378	3,500	478	400	815	615	233	400	70	34	34
27	292	333	1,220	378	352	6,140	680	233	352	55	43	34
28	218	378	845	2,120	307	5,630	815	268	233	43	55	55
29	187	187	1,140	3,100	268	2,650	815	352	202	43	43	70
30	187	136	1,900	4,500	.....	1,690	555	352	175	43	43	87
31	160	.....	980	16,100	.....	1,140	.....	268	.....	43	43	.....

Monthly discharge of Stillwater River near West Milton, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 600 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	3,100	76	454	0.757	0.87
November	1,900	76	330	.550	.61
December	3,500	21	573	.955	1.10
January	16,100	292	2,690	4.48	5.16
February	11,400	202	1,400	2.33	2.51
March	6,140	175	1,220	2.03	2.34
April	2,540	307	674	1.12	1.25
May	5,130	202	778	1.30	1.50
June	1,690	175	560	.933	1.04
July	202	43	94.1	.157	.18
August	175	34	62.9	.105	.12
September	127	34	56.2	.094	.10
The year	16,100	21	741	1.24	16.78

MAD RIVER NEAR SPRINGFIELD, OHIO.

LOCATION.—At the old mill about 800 feet south of Cleveland, Cincinnati, Chicago & St. Louis Railway bridge No. 121, and one-third mile below mouth of Buck Creek, near Springfield, Clark County.

DRAINAGE AREA.—488 square miles.

RECORDS AVAILABLE.—February 1, 1914, to September 30, 1916.

GAGE.—Vertical staff; lower section attached to north wall of rock-lined overflow channel from millrace; upper section attached to south side of old mill building; read by O. W. Bruney. Sea-level elevation of zero of gage, 887.81 feet.

DISCHARGE MEASUREMENTS.—Made from highway bridge about 1,000 feet below gage or by wading about 1,500 feet below gage.

CHANNEL AND CONTROL.—Channel shifts slightly during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.2 feet March 27 (discharge, 8,000 second-feet); minimum stage recorded, 1.3 feet during portions of August and September (discharge, 202 second-feet.)

The flood of March-April, 1913, reached a stage on March 25 represented by 19.2 feet, referred to gage datum.

ICE.—Stage-discharge relation is affected by ice during extremely cold weather.

ACCURACY.—Stage-discharge relation practically permanent; not seriously affected by ice during the year. Rating curve fairly well defined. Gage read daily to tenths. Daily discharge ascertained by applying daily gage heights to rating table except from July 6–17, for which it was estimated. Results good except at low stages when the lack of refinement in gage readings may affect the result.

COOPERATION.—Gage-height record furnished by the United States Weather Bureau. Results of discharge measurements furnished by the Miami Conservancy District.

Discharge measurements of Mad River near Springfield, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	B. H. Petty	1.80	249	Apr. 4	H. R. Daubenspeck	3.2	640
Jan. 13	do	7.0	2,980	May 29	G. N. Burrell	3.6	942
31	H. R. Daubenspeck	7.3	3,310	July 21	do	2.60	600
Mar. 27	do	9.05	5,475	Sept. 14	H. R. Daubenspeck	1.35	281

Daily discharge, in second-feet, of Mad River near Springfield, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	386	315	315	2,710	2,620	475	880	590	720	590	277	202
2	386	315	315	5,600	1,240	475	825	590	675	590	277	202
3	386	277	315	1,510	880	475	770	550	2,710	510	277	202
4	386	277	315	1,060	825	475	720	590	825	510	277	202
5	386	277	296	940	675	475	720	590	720	510	277	202
6	386	277	296	1,000	675	475	720	475	770	.....	277	245
7	386	277	296	720	630	2,040	675	6,030	2,360	.....	277	215
8	386	277	296	590	630	1,650	675	2,890	1,440	.....	277	202
9	386	277	296	510	590	630	675	1,180	1,310	.....	277	202
10	386	277	296	510	550	590	720	880	1,000	.....	277	202
11	360	277	296	442	550	550	940	770	825	.....	277	202
12	360	315	296	2,980	720	510	825	720	770	.....	260	202
13	336	296	296	5,810	550	510	720	630	720	.....	245	202
14	336	277	296	3,980	550	510	630	630	630	.....	245	202
15	336	277	296	1,000	550	510	550	590	590	.....	230	202
16	336	277	296	770	550	510	510	590	550	.....	215	215
17	336	277	315	315	550	510	590	590	720	.....	215	202
18	630	277	880	315	630	475	550	590	720	277	202	202
19	386	1,180	442	315	590	475	590	590	825	277	202	202
20	386	720	386	315	590	442	630	590	825	296	202	202
21	360	475	336	1,060	510	442	1,000	550	1,440	413	202	202
22	315	386	315	2,040	475	3,980	825	590	1,000	360	202	202
23	315	386	336	1,060	550	1,650	825	590	940	277	230	202
24	315	360	336	770	550	1,060	720	630	825	277	202	202
25	315	336	475	675	475	550	720	630	630	277	202	202
26	315	315	442	675	475	630	770	770	590	277	202	202
27	315	315	413	675	475	7,240	825	720	550	277	202	230
28	315	315	413	825	475	3,500	720	940	550	277	202	245
29	315	315	630	1,310	475	1,880	630	1,000	550	277	202	202
30	315	315	1,310	3,500	.....	1,240	590	1,060	510	277	202	202
31	315	.....	825	3,390	.....	1,000	.....	825	.....	277	202	.....

NOTE.—July 6–17 no gage readings reported. Mean daily discharge estimated at 305 second-feet from flow of Mad River at Dayton.

Monthly discharge of Mad River near Springfield, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 488 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	630	315	360	0.738	0.85
November	1,180	277	351	.719	.80
December	1,310	296	409	.838	.97
January	5,810	315	1,530	3.14	3.62
February	2,620	475	676	1.39	1.50
March	7,240	442	1,160	2.38	2.74
April	1,000	510	718	1.47	1.64
May	6,030	475	934	1.91	2.20
June	2,710	510	910	1.86	2.08
July	590	.....	338	.693	.80
August	277	202	236	.484	.56
September	245	202	207	.424	.47
The year	7,240	202	653	1.34	18.23

MAD RIVER NEAR DAYTON, OHIO.

LOCATION.—In the SE. ¼ sec. 8, T. 2 E., R. 8 N. Great Miami base line, at covered highway bridge about a mile northwest of Wright, Greene County, and 5 miles above Dayton.

DRAINAGE AREA.—652 square miles.

RECORDS AVAILABLE.—November 19, 1914, to September 30, 1916.

GAGE.—Vertical staff, attached to the downstream side of west abutment of bridge; read by John Morris. Sea-level elevation of zero of gage, 783.91 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge at gage or by wading about 150 feet above gage.

CHANNEL AND CONTROL.—Stream bed is made up of boulders and gravel; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.5 feet March 27 (discharge, 7,560 second-feet); minimum stage, 1.12 feet September 27 (discharge, 233 second-feet).

The flood of March-April, 1913, the highest known to have occurred at this station, reached a stage on March 25, 1913, represented by 14.0 feet, referred to gage datum.

ICE.—Stage-discharge relation seldom affected by ice, as velocities are high.

ACCURACY.—Stage-discharge relation practically permanent; not seriously affected by ice during the year. Rating curve fairly well defined below 5,500 second-feet and an extension above that stage. Gage read daily to tenths. Daily discharge ascertained by applying daily gage heights to rating table. Results good.

COOPERATION.—Gage-height record and results of discharge measurements furnished by Miami Conservancy District.

Discharge measurements of Mad River near Dayton, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 13	B. H. Petty	1.45	383	Aug. 2	G. N. Burrell	1.40	397
June 2	H. R. Daubenspeck	2.1	781	Sept. 1	do	1.20	265
July 3	do	1.8	544	Sept. 27	do	1.13	237

Daily discharge, in second-feet, of Mad River near Dayton, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	465	310	410	2,720	4,920	800	1,240	800	800	740	410	310
2	630	310	410	6,570	1,910	800	1,170	800	800	630	360	310
3	520	310	410	4,590	1,300	800	1,170	740	4,480	630	360	310
4	410	310	410	1,700	1,040	800	980	685	1,560	575	360	310
5	1,170	310	360	1,360	980	520	920	685	1,040	520	360	310
6	685	310	310	1,500	980	2,460	860	685	920	410	360	630
7	575	265	310	1,100	920	1,630	800	3,850	2,720	410	360	410
8	575	265	310	920	800	980	800	6,020	2,380	410	360	360
9	410	265	265	800	800	860	920	1,630	1,560	410	630	310
10	410	265	265	800	800	800	980	1,300	1,360	410	410	310
11	360	265	265	1,100	740	800	920	980	1,770	410	410	310
12	360	310	265	3,260	980	740	920	860	1,170	410	410	310
13	360	310	265	6,130	1,100	740	860	685	920	410	410	310
14	360	310	265	2,720	860	740	800	685	860	410	410	310
15	465	360	265	1,430	800	740	800	685	860	410	410	310
16	410	310	265	980	685	740	800	685	800	360	360	310
17	360	310	520	800	685	740	800	630	920	360	360	310
18	410	310	1,770	685	980	740	800	520	980	310	360	310
19	1,240	1,040	860	520	860	630	800	410	1,040	310	360	310
20	685	1,300	630	685	800	630	800	410	860	310	360	310
21	630	920	575	1,430	800	630	1,300	410	980	685	360	310
22	575	630	520	2,630	800	2,990	980	800	1,430	575	310	310
23	520	575	520	1,630	860	3,450	860	800	1,100	520	310	310
24	410	520	520	1,240	920	1,630	860	800	920	520	265	310
25	360	520	630	1,100	860	1,240	860	800	740	465	265	310
26	360	465	1,040	1,040	800	1,100	860	1,910	685	410	265	310
27	310	465	740	980	800	6,240	1,300	1,100	630	410	410	310
28	310	465	740	1,170	800	6,570	1,100	1,100	630	410	360	310
29	310	465	1,100	1,840	800	2,810	980	1,360	685	410	360	360
30	310	410	2,460	4,370	.....	1,840	860	1,240	685	410	360	360
31	310	.....	1,500	5,800	.....	1,500	.....	920	.....	410	310	.....

Monthly discharge of Mad River near Dayton, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 652 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,240	310	492	0.755	0.87
November	1,300	265	439	.672	.75
December	2,460	265	619	.949	1.09
January	6,570	520	2,050	3.14	3.62
February	4,920	685	1,050	1.61	1.74
March	6,570	520	1,540	2.36	2.72
April	1,300	800	937	1.44	1.61
May	6,020	410	1,130	1.73	1.99
June	4,480	630	1,210	1.86	2.08
July	740	310	454	.696	.80
August	630	260	368	.563	.65
September	630	310	329	.505	.56
The year	6,570	265	885	1.36	18.48

BUCK CREEK AT SPRINGFIELD, OHIO.

LOCATION.—At Plum Street Bridge in Springfield, Clark County.

DRAINAGE AREA.—163 square miles.

RECORDS AVAILABLE.—July 15, 1914, to September 30, 1916.

GAGE.—Vertical staff in two sections; read by S. Van Bird, jr. Sea-level elevation of zero of gage, 908.2 feet.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Channel may shift slightly during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 10.30 a. m., March 27 (discharge, 3,030 second-feet); minimum stage, 0.9 foot at 7 a. m., December 16 (discharge, 68 second-feet).

The flood of March-April, 1913, the highest known to have occurred at this station, reached a stage on March 25, 1913, represented by 12.3 feet, referred to gage datum.

ICE.—Stage-discharge relation affected by ice for short periods only, as the use of water for condensing purposes at points above the gage tends to keep the temperature above freezing.

ACCURACY.—Stage-discharge relation changed during high water latter part of March; rating curves used before and after March 26 fairly well defined. Stage-discharge relation not seriously affected by ice. Gage read daily to tenths. Daily discharge ascertained by applying gage heights to rating table. Results fair.

COOPERATION.—Station maintained and base data furnished by the Miami Conservancy District.

Discharge measurements of Buck Creek at Springfield, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	B. H. Petty	1.00	68	May 29	G. N. Burrell	2.4	333
Jan. 13	do	3.62	709	July 10	H. R. Daubenspeck	1.35	111
31	H. R. Daubenspeck	3.80	796	21	G. N. Burrell	1.30	103
Mar. 27	do	7.9	2,960	Sept. 14	H. R. Daubenspeck	1.05	79.9
Apr. 4	do	2.0	227				

Daily discharge, in second-feet, of Buck Creek at Springfield, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	102	64	64	1,300	356	131	203	146	163	95	95	85
2	102	64	64	700	243	116	203	131	146	95	85	85
3	102	64	64	650	178	116	226	131	1,600	95	85	85
4	88	64	64	210	162	102	163	131	226	106	106	85
5	386	64	64	210	162	102	163	131	203	106	118	85
6	131	64	64	210	162	116	163	131	182	106	95	95
7	131	64	64	178	162	650	163	535	755	106	118	85
8	102	64	64	178	162	243	163	440	500	106	131	95
9	102	64	64	146	162	146	182	325	275	95	106	85
10	88	64	64	146	162	178	203	250	300	95	95	85
11	88	64	64	303	162	131	226	182	275	95	85	76
12	75	75	75	1,240	226	131	203	163	203	95	85	76
13	102	64	75	1,590	162	131	163	146	163	95	85	76
14	75	75	64	281	162	146	163	146	146	106	85	76
15	75	75	64	243	146	146	163	131	131	95	85	76
16	75	75	53	194	162	146	163	131	131	85	85	76
17	75	64	131	178	162	162	146	131	146	85	85	76
18	131	64	226	162	194	162	146	118	250	85	85	76
19	102	303	194	162	162	146	146	118	182	85	85	76
20	88	194	116	146	162	146	146	106	146	85	85	76
21	75	131	102	303	146	131	275	106	410	118	85	76
22	75	102	88	485	146	1,650	163	118	250	95	76	76
23	75	102	131	281	162	303	146	182	182	85	76	76
24	75	102	116	210	162	261	146	146	163	85	76	76
25	75	102	116	194	162	194	146	131	146	85	76	76
26	75	88	116	194	162	243	182	440	131	118	76	76
27	64	88	116	194	146	2,910	203	182	131	95	106	76
28	64	88	178	210	146	605	182	226	118	85	85	85
29	64	88	261	328	146	380	163	203	95	85	85	95
30	64	88	261	1,650	.....	300	146	350	95	85	85	76
31	64	.....	261	650	.....	226	.....	163	.....	85	85	.....

Monthly discharge of Buck Creek at Springfield, Ohio, for the year ending Sept. 30, 1916.

[Drainage area, 163 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	386	64	96.5	0.592	0.68
November	303	64	89.1	.547	.61
December	261	53	111	.681	.79
January	1,650	146	423	2.59	2.99
February	356	146	172	1.06	1.14
March	2,910	102	340	2.09	2.41
April	275	146	175	1.07	1.19
May	535	106	193	1.18	1.36
June	1,600	95	261	1.60	1.78
July	118	85	94.7	.581	.67
August	131	76	90.2	.553	.64
September	95	76	80.6	.494	.55
The year	2,910	53	177	1.09	14.81

TWIN CREEK NEAR GERMANTOWN, OHIO.

LOCATION.—At covered highway bridge in the NE. ¼ sec. 14, T. 3 N., R. 4 E., about 1 mile west of Germantown, Montgomery County, and about 2 miles above mouth of Little Twin Creek, entering from the left.

DRAINAGE AREA.—272 square miles.

RECORDS AVAILABLE.—April 12, 1914, to September 30, 1916.

GAGE.—Vertical staff in two sections; read by Thomas Stettler. Sea-level elevation of zero gage, 712.73 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of the bridge or by wading about 200 feet above gage. The bridge makes an angle of about 45 degrees with the direction of the current. Flood measurements will be made at the highway bridge about half a mile below the gage.

CHANNEL AND CONTROL.—Channel shifts slightly during floods.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.5 feet at noon, January 31; minimum stage, 1.1 feet September 24–27.

The flood of March–April, 1913, the highest known to have occurred at this station, reached a stage on March 25 of 18.3 feet, referred to gage datum.

ICE.—Stage-discharge relation affected by ice and occasionally by ice jams.

ACCURACY.—Stage-discharge relation not permanent; not seriously affected by ice during the year. Rating curve not developed. Measurements indicate considerable change in control. Gage read daily to tenths.

COOPERATION.—Gage-height record and results of discharge measurements furnished by the Miami Conservancy District.

Discharge measurements of Twin Creek near Germantown, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 18	B. H. Petty	1.45	66	Aug. 1	H. R. Daubenspeck	1.45	26.1
June 3	H. R. Daubenspeck	4.72	1.890	Sept. 18	do	1.15	17.8
July 6	do	1.70	60.8				

Daily gage height, in feet, of Twin Creek near Germantown, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.5	1.7	1.8	5.6	5.4	2.2	2.7	2.1	1.9	1.8	1.5	1.3
2	2.5	1.6	1.8	8.6	3.7	2.1	2.5	2.0	1.8	1.8	1.7	1.7
3	2.2	1.6	1.8	4.4	3.1	2.1	2.4	2.0	9.0	1.8	1.6	1.4
4	2.1	1.6	1.7	3.3	2.7	2.1	2.4	2.1	3.4	1.8	1.5	1.3
5	2.0	1.6	1.7	3.0	2.6	2.0	2.3	2.1	2.7	1.7	1.6	1.3
6	1.8	1.5	1.7	3.2	2.5	2.0	2.3	2.0	2.3	1.7	1.8	1.3
7	1.7	1.5	1.6	2.8	2.4	4.7	2.2	2.1	7.0	1.7	1.7	1.3
8	1.7	1.5	1.6	2.6	2.2	3.6	2.1	3.6	4.3	1.7	1.7	1.5
9	1.7	1.5	1.6	2.2	2.3	2.7	2.2	2.7	3.4	1.6	2.8	1.4
10	1.6	1.5	1.6	2.3	2.2	2.6	2.2	2.4	3.3	1.6	2.0	1.3
11	1.6	1.5	1.6	3.1	2.2	2.4	2.2	2.2	3.3	1.6	1.8	1.3
12	1.6	1.5	1.6	8.0	2.7	2.3	2.2	2.0	2.8	1.6	1.7	1.3
13	1.6	1.5	1.6	9.5	3.2	2.2	2.1	2.0	2.5	1.6	1.7	1.3
14	1.6	1.5	1.6	3.8	2.8	2.3	2.1	2.0	2.3	1.6	1.6	1.2
15	2.1	1.5	1.5	2.8	2.5	2.3	2.1	2.0	2.2	1.6	1.6	1.2
16	2.0	1.5	1.5	2.7	2.5	2.3	2.0	1.9	2.1	1.6	1.6	1.2
17	1.8	1.5	2.2	2.5	2.6	2.2	2.0	1.9	2.4	1.6	1.5	1.2
18	1.9	1.5	5.0	2.3	2.8	2.2	2.0	1.8	2.7	1.6	1.5	1.2
19	4.2	4.9	3.1	2.1	2.6	2.1	2.0	1.8	2.3	1.6	1.5	1.2
20	3.2	3.9	2.5	2.2	2.5	2.1	2.0	1.8	2.1	1.6	1.5	1.2
21	2.7	3.0	2.3	3.6	2.5	2.2	2.8	1.8	2.1	1.6	1.6	1.2
22	2.4	2.5	2.2	5.9	2.4	2.5	3.1	1.8	3.1	2.2	1.6	1.2
23	2.2	2.3	2.1	3.5	2.5	3.3	2.6	1.9	2.5	1.8	1.5	1.2
24	2.1	2.2	2.2	3.0	2.8	2.8	2.4	1.8	2.2	1.7	1.4	1.1
25	2.0	2.0	2.5	2.7	2.7	2.6	2.2	1.8	2.1	1.7	1.4	1.1
26	1.9	2.0	3.7	2.6	2.5	2.5	2.2	1.8	2.0	1.6	1.4	1.1
27	1.8	2.1	2.9	2.7	2.3	5.6	2.4	1.7	1.9	1.6	1.4	1.1
28	1.8	1.9	2.8	4.0	2.2	6.3	2.4	1.8	1.9	1.6	1.4	1.6
29	1.7	1.9	2.8	7.1	2.2	3.7	2.3	1.9	1.9	1.5	1.3	1.7
30	1.7	1.9	5.1	7.5	.....	3.1	2.1	2.1	1.8	1.5	1.3	1.4
31	1.7	.....	4.0	8.9	.....	2.9	.....	2.0	.....	1.5	1.3	.....

FOURMILE CREEK NEAR SEVENMILE, OHIO.

LOCATION.—In the NW. ¼ sec. 7, T. 2 N., R. 3 E. first principal meridian, at the steel-truss highway bridge about 2 miles southwest of Sevenmile, Butler County, and about 5 miles above the junction with the Miami, near Hamilton.

DRAINAGE AREA.—178 square miles.

RECORDS AVAILABLE.—November 17, 1914, to September 30, 1916.

GAGE.—Vertical staff in two sections; read by W. B. Eaton. The lower section is on downstream side of bridge pier; upper section is on tree on right bank just below bridge. Sea-level elevation of zero of gage, 618.69 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge at gage or by wading 700 feet above gage.

CHANNEL AND CONTROL.—Stream bed is composed of gravel; shifts considerably during floods.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.9 feet at 9 p. m. and 8 a. m. January 12 and 31, respectively; minimum stage, 0.3 foot, September 15–26. Maximum stage recorded, 18 feet, March 25, 1913.

ICE.—Stage-discharge relation may be affected by ice jams at times.

ACCURACY.—Stage-discharge relation not permanent; not seriously affected by ice during the year. Rating curve not developed. Recent measurements indicate some change in control. Gage read to tenths once daily.

COOPERATION.—Gage-height record and results of discharge measurements furnished by the Miami Conservancy District.

Discharge measurements of Fourmile Creek near Sevenmile, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 1	B. H. Petty	1.75	82.5	July 25	G. N. Burrell	0.90	7.7
Jan. 13	H. R. Daubenspeck	3.45	1,160	Sept. 1	H. R. Daubenspeck	.70	2.7
July 7	G. N. Burrell	1.1	20.1				

Daily gage height, in feet, of Fourmile Creek near Sevenmile, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.9	2.2	1.8	4.5	6.2	1.2	2.8	2.1	3.0	1.3	1.1	1.1
2	2.8	2.2	1.7	3.9	4.5	1.4	2.8	2.0	3.2	1.3	1.1	1.1
3	2.7	2.1	1.6	3.6	3.9	1.2	2.8	3.2	3.6	1.3	1.1	1.1
4	2.7	1.9	1.6	3.0	3.3	1.3	2.7	2.8	3.6	1.3	1.0	1.1
5	2.7	1.8	1.5	3.2	2.9	1.2	2.6	2.6	3.9	1.4	1.0	1.1
6	2.6	1.7	1.4	2.9	2.5	3.5	2.5	2.6	3.8	1.4	1.0	1.1
7	2.6	1.7	1.4	2.6	2.3	2.9	2.7	3.1	3.4	1.4	1.0	1.1
8	2.5	1.7	1.3	3.4	2.2	2.5	2.8	2.6	3.0	1.4	1.0	1.1
9	2.5	1.7	1.5	2.9	2.1	2.2	2.5	2.1	2.6	1.4	1.2	1.1
10	2.5	1.6	1.5	3.2	2.1	1.9	2.5	2.0	2.0	1.4	1.1	.8
11	2.5	1.7	1.3	4.3	2.1	1.9	2.4	2.0	2.0	1.4	1.1	.8
12	2.4	1.6	1.5	6.0	4.3	1.8	2.2	2.0	2.3	1.0	2.2	.8
13	2.4	1.6	1.4	4.5	3.3	1.6	2.0	1.9	2.1	.8	1.4	.6
14	2.4	1.6	1.2	3.7	2.9	1.4	2.0	1.9	1.9	1.0	1.1	.6
15	2.9	1.5	1.8	3.0	2.6	1.4	2.0	1.8	1.9	1.0	1.1	.3
16	2.7	1.6	3.7	2.5	2.9	1.3	1.9	1.7	1.7	1.0	1.1	.3
17	2.7	1.4	4.8	1.9	3.2	1.3	1.8	1.7	1.6	1.1	1.1	.3
18	3.5	1.4	2.6	1.9	3.0	1.2	2.0	1.6	1.6	1.1	1.1	.3
19	3.1	3.4	2.3	1.9	2.7	1.9	2.0	1.6	1.6	1.1	1.1	.3
20	2.9	3.0	2.0	2.5	2.4	1.9	2.1	1.6	1.5	1.2	1.1	.3
21	2.8	2.3	1.9	3.0	2.2	1.8	3.0	1.6	1.5	1.2	1.1	.3
22	2.7	2.0	2.6	4.0	1.9	1.9	2.7	1.9	1.5	1.2	1.1	.3
23	2.7	2.0	2.8	2.7	1.8	2.0	2.7	1.9	1.5	1.2	1.1	.3
24	2.7	1.9	3.4	2.5	1.6	2.0	2.6	2.3	1.5	.6	1.1	.3
25	2.6	2.0	3.1	2.3	1.7	2.0	2.4	2.6	1.4	1.1	1.1	.3
26	2.6	2.2	2.8	2.5	1.5	2.0	2.4	3.5	1.4	1.1	1.1	.3
27	2.6	2.0	2.4	2.7	1.4	3.9	2.3	3.6	1.4	1.1	1.1	2.1
28	2.5	2.0	2.5	3.0	1.3	3.4	2.3	3.9	1.4	1.2	1.9	1.6
29	2.4	1.8	2.9	4.9	1.3	3.1	2.1	3.5	1.4	1.1	1.1	1.3
30	2.4	1.8	2.9	6.0	.....	2.9	2.1	3.5	1.3	1.1	1.1	1.3
31	2.3	.....	3.8	9.6	.....	2.9	.....	3.0	.....	1.1	1.1	.....

SEVENMILE CREEK AT SEVENMILE, OHIO.

LOCATION.—On line between sec. 5, T. 2 N., R. 3 E., and sec. 32, T. 3 N., R. 3 E. first principal meridian, at covered highway bridge about half a mile west of Sevenmile Butler County, and about 1 mile above junction with Fourmile Creek.

DRAINAGE AREA.—128 square miles.

RECORDS AVAILABLE.—November 17, 1914, to September 30, 1916.

GAGE.—Vertical staff on downstream side of west abutment; read by H. L. Kumler. Sea-level elevation of zero of gage, 623.1 feet.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading just above bridge.

CHANNEL AND CONTROL.—Stream bed at the gage is for the most part limestone bedrock in horizontal layers; although some gravel occurs along the east side, the section is practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.0 feet at 7.30 a. m. January 12 and 31; minimum stage, 1.7 feet September 13–27.

Maximum stage recorded, 17 feet March 25, 1913.

ICE.—Stream is seldom covered with ice on account of the high velocities, but stage-discharge relation is sometimes affected by ice jams.

ACCURACY.—Stage-discharge relation practically permanent; not seriously affected by ice during year. Rating curve not developed. Gage read daily to tenths.

COOPERATION.—Gage-height record and results of discharge measurements furnished by the Miami Conservancy District.

Discharge measurements of Sevenmile Creek at Sevenmile, Ohio, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 1	B. H. Petty	2.10	77.3	July 7	G. N. Burrell	2.05	26.1
Jan. 13	H. R. Daubenspeck	4.25	1,080	25	do	1.90	9.5
May 5	do	2.4	102	Sept. 1	H. R. Daubenspeck	1.75	7.5
26	G. N. Burrell	2.15	33.7				

Daily gage height, in feet, of Sevenmile Creek at Sevenmile, Ohio, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.5	2.1	2.1	4.8	4.2	2.4	2.8	2.4	2.4	2.2	1.8	1.8
2	2.6	2.1	2.1	5.0	3.5	2.5	2.8	2.4	2.3	2.2	1.8	1.8
3	2.5	2.1	2.1	3.5	3.1	2.4	2.7	2.4	6.0	2.1	1.8	1.8
4	2.3	2.1	2.1	3.0	2.9	2.5	2.7	2.5	3.8	2.1	1.8	1.8
5	2.3	2.0	2.1	3.0	2.9	2.4	2.7	2.4	3.2	2.1	1.8	1.8
6	2.2	2.0	2.1	3.0	2.8	2.4	2.6	2.5	2.6	2.1	1.8	1.8
7	2.0	2.0	2.1	2.8	2.8	3.9	2.5	3.9	4.5	2.1	1.8	1.8
8	2.0	2.0	2.1	2.6	2.6	3.3	2.5	2.8	3.5	2.1	1.8	1.8
9	1.9	2.0	2.1	2.5	2.6	2.8	2.5	2.5	3.2	2.1	2.1	1.8
10	1.9	2.0	2.1	2.5	2.5	2.9	2.8	2.4	3.0	2.1	2.0	1.8
11	1.9	2.0	2.1	3.2	2.6	2.7	2.6	2.4	3.2	2.1	1.9	1.8
12	1.9	2.0	2.0	6.5	3.6	2.7	2.6	2.4	2.8	2.1	1.9	1.8
13	1.9	2.0	2.0	5.0	3.3	2.7	2.5	2.4	2.6	2.1	2.5	1.7
14	2.1	2.0	2.0	3.9	2.8	2.7	2.5	2.4	2.5	2.0	2.2	1.7
15	2.6	1.9	2.2	3.0	2.7	2.5	2.5	2.4	2.5	2.0	2.2	1.7
16	2.2	1.9	2.0	2.8	2.6	2.5	2.5	2.3	2.5	2.0	2.0	1.7
17	2.2	1.9	4.4	2.5	2.9	2.5	2.4	2.3	2.8	2.0	2.0	1.7
18	2.8	1.9	3.8	2.5	3.1	2.5	2.4	2.3	2.6	2.0	1.9	1.7
19	3.0	4.3	3.0	2.5	2.8	2.5	2.4	2.3	2.6	1.9	1.9	1.7
20	2.8	3.1	2.6	2.4	2.8	2.5	2.4	2.3	2.6	1.9	2.2	1.7
21	2.5	2.7	2.6	3.5	2.7	2.5	3.4	2.2	2.8	1.9	2.0	1.7
22	2.4	2.5	2.5	4.7	2.6	2.9	3.0	2.2	3.0	1.9	1.9	1.7
23	2.4	2.4	2.4	3.7	2.8	2.9	2.8	2.3	2.6	1.9	1.9	1.7
24	2.2	2.4	2.4	2.8	2.9	2.8	2.6	2.3	2.5	1.9	1.9	1.7
25	2.1	2.3	2.9	2.8	2.8	2.8	2.5	2.3	2.4	1.9	1.8	1.7
26	2.1	2.2	3.0	2.8	2.7	2.8	2.8	2.2	2.4	1.9	1.8	1.7
27	2.0	2.3	2.7	2.9	2.6	4.8	2.8	2.3	2.4	1.9	1.8	1.7
28	2.0	2.2	2.8	3.5	2.6	3.9	2.6	2.3	2.4	1.9	1.8	1.8
29	1.9	2.2	4.6	6.0	2.6	3.3	2.5	2.3	2.3	1.8	1.8	2.0
30	1.9	2.2	3.7	6.9	.....	3.0	2.5	2.8	2.3	1.8	1.8	1.8
31	2.2	.....	3.5	9.9	.....	2.9	.....	2.6	.....	1.8	1.8	.....

WHITEWATER RIVER AT BROOKVILLE, IND.

LOCATION.—At the two-span steel highway bridge about three-fourths mile south of Brookville, Franklin County, and about 2,000 feet below the junction of East and West forks of Whitewater River.

DRAINAGE AREA.—1,180 square miles.

RECORDS AVAILABLE.—June 8, 1915, to September 30, 1916.

GAGE.—Chain gage fastened to downstream side of bridge; read by H. Koerner.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Control about 500 feet below gage is probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 17.18 feet January 31, 1916 (discharge, about 54,000 second-feet); minimum stage, 1.15 feet July 18, 1916 (discharge, 181 second-feet).

REGULATION.—Flow regulated to some extent by the Thompson-Norris strawboard mill at Brookville. Water is diverted from the West Fork about 10 miles above station and flows down the old Whitewater canal to the mill and is returned to the river a few hundred feet above junction of the East and West forks.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during year. Rating curve well defined between 200 and 12,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Daily gage height record, data for station description, and results of discharge measurements furnished by the United States Army Engineers.

Discharge measurements of Whitewater River at Brookville, Ind., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914–15.		*Feet.*	*Sec.-ft.*	1915–16.		*Feet.*	*Sec.-ft.*
June 9	Crosley and Daubenspeck.	2.2	697	June 1	Crosley and Shepard	2.29	811
				7	L. M. Crosley	5.70	7,500
July 2	H. R. Daubenspeck	1.85	393	7	do	5.81	7,540
Sept. 2	L. M. Crosley	2.20	628	7	do	5.88	7,860
13	do	2.13	564	7	do	5.70	7,300
16	do	2.17	668	8	do	4.32	3,800
16	do	2.24	640	8	do	4.24	3,690
				9	do	3.62	2,540
1915–16.				9	do	3.51	2,340
Nov. 5	L. M. Crosley	1.83	359	Aug. 8	do	4.66	4,690
Feb. 1	do	7.86	8,580	Sept. 21	do	1.28	201
1	do	6.97	9,560				

Daily discharge, in second-feet, of Whitewater River at Brookville, Ind., for the years ending Sept. 30, 1915 and 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					1915.				
1	.....	308	788	740	17	1,100	2,680	1,220	570
2	.....	352	4,050	650	18	462	1,400	1,160	610
3	.....	375	1,160	695	19	1,620	3,230	1,040	835
4	.....	328	1,160	650	20	835	1,840	2,000	650
5	.....	695	935	835	21	650	1,480	4,960	430
6	.....	650	610	788	22	532	885	2,860	495
7	.....	2,680	532	1,400	23	495	695	2,000	375
8	835	16,600	1,480	1,220	24	352	532	3,040	375
9	740	6,990	7,840	1,100	25	352	532	2,320	375
10	462	1,690	1,340	1,220	26	308	462	1,760	352
11	430	1,840	6,720	695	27	288	402	1,220	788
12	375	1,280	6,450	570	28	308	570	1,040	1,400
13	375	990	2,680	532	29	308	1,540	990	935
14	352	788	4,730	430	30	308	610	1,100	740
15	650	835	2,500	495	31	.....	462	835	.....
16	1,340	1,280	1,480	495					

Daily discharge, in second-feet, of Whitewater River at Brookville, Ind., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	740	430	650	7,840	20,300	1,100	2,000	1,340	740	610	272	272
2	650	402	570	7,550	5,190	1,040	1,840	1,220	695	570	255	228
3	532	375	495	7,550	4,270	935	1,840	1,280	2,860	495	255	242
4	495	402	430	4,500	2,680	1,340	1,540	2,680	1,760	462	375	218
5	402	375	462	4,050	2,500	2,320	1,280	1,760	1,540	402	462	218
6	328	352	532	3,620	2,320	2,500	1,100	1,400	2,160	402	430	218
7	402	288	532	2,500	2,160	5,920	1,160	2,000	6,990	375	352	218
8	375	375	495	2,160	1,760	3,620	1,160	3,230	3,620	375	2,000	228
9	375	430	430	1,760	1,760	2,160	1,160	1,840	2,000	288	2,680	255
10	375	375	402	1,840	1,480	1,840	1,760	1,340	3,040	308	1,040	228
11	375	402	1,400	3,040	2,160	1,690	1,340	1,280	2,860	308	650	208
12	352	462	495	22,000	5,430	1,540	1,280	1,040	1,760	308	532	208
13	352	402	462	16,100	4,500	1,400	1,160	990	1,340	352	462	218
14	495	402	375	4,500	2,860	1,400	935	885	1,100	328	430	218
15	695	375	570	3,420	1,690	1,620	935	835	1,100	328	375	208
16	532	352	1,620	2,160	1,760	1,160	935	885	990	272	352	208
17	1,480	352	4,270	1,620	2,320	1,160	885	788	1,100	288	308	208
18	1,480	835	2,680	1,480	2,680	1,160	835	740	885	181	272	208
19	2,160	2,680	1,400	1,540	1,760	1,100	788	650	1,040	190	352	199
20	1,280	2,000	1,280	3,230	1,690	1,220	740	650	835	352	495	199
21	990	1,220	1,280	4,500	1,540	1,100	15,300	650	1,840	695	308	199
22	835	1,040	935	5,430	1,540	1,690	3,830	695	2,680	462	288	208
23	788	935	2,500	3,830	1,840	1,840	1,840	740	1,400	352	272	199
24	532	885	2,860	2,860	2,160	2,500	2,160	650	1,100	352	255	208
25	570	788	2,320	2,500	1,840	1,280	2,160	610	835	308	242	199
26	495	740	5,920	2,160	1,620	1,840	2,320	532	740	288	242	199
27	462	788	3,830	2,500	1,220	7,840	2,680	570	650	272	242	190
28	462	650	2,860	4,730	1,100	5,670	2,500	695	610	272	242	228
29	430	740	2,160	13,400	1,160	3,830	1,840	1,840	570	375	255	272
30	402	532	3,620	31,700	.....	2,860	1,620	1,690	532	288	242	242
31	375	.....	13,000	53,900	.....	2,160	.....	990	.....	255	242	.....

NOTE.—Stage discharge relation possibly affected by backwater Jan. 31 and Feb. 1; discharge Jan. 31 estimated from precipitation records, and Feb. 1 from two current-meter measurements made on that date. Gage height not reported Dec. 31; discharge estimated from that of preceding and following days by comparison with record of Miami River at Tadmor, Ohio.

Monthly discharge of Whitewater River at Brookville, Ind., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on dramage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
June 8–30	.....	.....	586	0.497	.....
July	16,600	308	1,770	1.50	1.73
August	7,840	532	2,320	1.97	2.27
September	1,400	352	715	.606	.68
1915–16.					
October	2,160	328	652	.553	.64
November	2,680	288	679	.575	.64
December	13,000	375	1,960	1.66	1.91
January	53,900	1,480	7,420	6.29	7.25
February	20,300	1,100	2,940	2.49	2.68
March	7,840	935	2,220	1.88	2.17
April	15,300	740	2,030	1.72	1.92
May	3,230	532	1,180	1.00	1.15
June	6,990	532	1,650	1.40	1.56
July	695	181	358	.303	.35
August	2,680	242	490	.415	.48
September	272	190	218	.185	.21
The year	53,900	181	1,820	1.54	20.96

KENTUCKY RIVER BASIN.

DIX RIVER NEAR BURGIN, KY.

LOCATION.—At covered wooden highway bridge on the Burgin and Buena Vista pike, 3¾ miles due east of Burgin, Mercer County. Kennedy's mill is one-fourth mile above the station.

DRAINAGE AREA.—395 square miles (86 per cent measured on topographic maps and 14 per cent on scale 1 : 500,000, map of Kentucky, prepared by U. S. Geological Survey).

RECORDS AVAILABLE.—July 2, 1910, to July 16, 1911; October 1, 1911, to September 30, 1916.

GAGE.—Staff gage attached to right upstream wing wall of bridge near face of abutment; read twice daily to hundredths by Frank Martin. Soundings taken at the measuring section indicate that the zero of the gage as replaced by the observer on February 15, 1913, is approximately 0.2 foot below zero of gage installed when station was established. Gage readings subsequent to February 15, 1913, refer to a datum which is about 0.2 foot below datum of original gage.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge, from a boat, or by wading.

CHANNEL AND CONTROL.—Probably permanent except during extreme floods. At stages above low water the growth of foliage on trees and brush at the control may affect the stage-discharge relation to a small extent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year: 22.8 feet at 7 a. m. December 17; discharge, 19,400 second-feet. Minimum stage recorded: 2.72 feet at 6 a. m. and 5 p. m. September 25; discharge, 1.7 second-feet.

Maximum stage about 30 feet; date unknown.

ICE.—No ice at the station.

DIVERSIONS.—None.

REGULATION.—None. The dam at Kennedy's mill is partly destroyed and mill is not operated.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Two rating curves used applicable as follows: October 1, 1912, to January 6, 1913, well defined between 50 and 6,500 second-feet, and fairly well defined between 6,500 and 12,000 second-feet; January 7, 1913, to September 30, 1916, well defined up to 455 second-feet and fairly well defined between 455 and 12,000 second-feet. Gage read once daily to tenths, 1912–13 and 1913–14, twice daily to tenths in 1914–15, and to quarter tenths and hundredths during 1915–16. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Stations maintained in cooperation with Kentucky State Geological Survey, J. B. Hoeing, State Geologist.

The following discharge measurements were made during the year:

April 27, 1916; by A. H. Horton: Gage height, 4.07 feet; discharge, 111 second-feet

September 18, 1916; by B. E. Jones: Gage height, 2.82 feet; discharge, 3.1 second-feet.

Daily discharge, in second-feet, of Dix River near Burgin, Ky., for the years ending Sept. 30, 1913–1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	41	15	50	2,500	1,150	1,800	780	331	691	28	2.5	1.5
2	41	20	60	2,180	1,150	1,340	649	280	608	28	2.5	1.5
3	41	20	195	1,800	649	925	455	280	1,090	116	2.5	1.5
4	41	26	270	1,880	1,150	421	331	280	691	85	10	1.5
5	33	50	420	1,880	1,800	421	359	256	529	50	10	1.5
6	33	60	6,000	5,350	2,590	389	331	233	421	35	2.5	1.5
7	26	84	2,670	23,600	1,800	421	331	190	305	28	2.5	1.5
8	26	84	1,240	27,400	1,150	455	305	151	233	28	2.5	1.5
9	26	115	704	18,800	1,150	421	305	116	151	28	2.5	1.5
10	26	327	590	11,900	649	389	421	116	116	28	2.5	1.5
11	26	298	554	6,750	1,800	359	455	85	100	21	2.5	1.5
12	26	270	554	23,600	1,150	305	455	85	100	21	2.5	1.5
13	26	244	485	14,500	649	529	389	85	72	15	2.5	1.5
14	26	219	485	6,750	649	7,230	359	85	50	10	2.5	1.5
15	20	172	452	3,500	389	3,700	280	72	42	2.5	2.5	1.5
16	20	115	452	1,800	389	1,600	256	72	28	2.5	2.5	1.5
17	20	115	420	1,800	359	649	211	72	28	2.5	2.5	1.5
18	20	115	420	5,600	359	568	190	60	28	2.5	2.5	1.5
19	20	115	420	3,500	359	529	151	60	28	2.5	2.5	1.5
20	20	115	420	3,500	359	455	116	85	28	2.5	6	1.5
21	20	99	388	5,600	359	421	100	211	21	2.5	50	1.5
22	20	84	388	4,500	359	1,030	100	1,600	28	2.5	50	1.5
23	20	84	388	3,500	331	975	100	1,340	28	2.5	190	1.5
24	20	71	388	11,900	331	875	85	1,940	1,800	2.5	190	1.5
25	20	60	357	6,750	491	925	100	1,030	568	2.5	133	1.5
26	20	60	357	4,500	780	21,600	170	925	331	2.5	100	1.5
27	15	50	357	3,500	1,800	25,700	491	875	116	35	50	1.5
28	15	50	554	2,590	2,420	10,100	975	875	72	21	28	1.5
29	15	50	704	2,590	.....	3,310	529	875	42	10	10	1.5
30	15	50	704	1,800	.....	2,170	529	825	35	10	2.5	1.5
31	15	.....	2,940	1,150	.....	1,210	.....	825	.....	2.5	1.5	.....
1913–14.												
1	2.5	28	389	.....	975	529	1,030	305	35	2.5	28	72
2	2.5	28	491	.....	925	421	2,250	256	50	2.5	72	72
3	2.5	28	568	.....	875	359	1,460	190	50	2.5	85	72
4	2.5	28	455	.....	875	491	1,090	170	85	2.5	85	50
5	2.5	28	421	.....	825	455	875	10,900	170	2.5	85	72
6	2.5	28	331	.....	780	421	780	7,740	256	2.5	85	72
7	2.5	60	780	.....	1,150	389	608	3,040	735	2.5	85	649
8	2.5	60	649	.....	1,870	389	735	1,660	211	2.5	85	4,100
9	2.5	85	491	.....	1,460	359	825	735	170	2.5	85	1,030
10	2.5	60	389	.....	735	305	691	608	72	2.5	100	1,030
11	2.5	42	359	.....	608	568	568	568	42	2.5	100	2,950
12	2.5	42	280	.....	491	6,750	455	455	28	2.5	280	780
13	2.5	35	280	.....	735	3,400	389	389	10	2.5	305	780
14	2.5	35	233	.....	3,800	1,870	305	305	10	2.5	825	491
15	2.5	35	190	.....	1,940	1,460	280	256	10	211	256	421
16	2.5	72	280	.....	1,730	1,270	780	190	10	305	100	305
17	2.5	100	233	.....	1,030	1,090	649	133	10	151	85	305
18	2.5	211	211	.....	3,310	875	608	133	10	100	60	256
19	72	491	190	.....	9,170	780	529	116	10	72	50	211
20	72	211	190	.....	5,380	649	491	100	10	28	35	133
21	100	211	170	.....	2,500	568	1,340	100	10	10	35	100
22	151	256	256	.....	1,530	455	1,090	85	10	10	35	116
23	85	608	280	.....	1,030	389	875	50	10	10	35	72
24	60	421	1,800	.....	925	421	691	28	10	10	649	60
25	50	455	1,870	.....	780	491	568	85	10	10	568	60
26	50	455	1,730	.....	649	280	568	85	10	10	421	60
27	42	421	1,600	.....	608	389	491	85	10	10	331	28
28	28	421	1,400	.....	608	389	455	85	10	10	256	28
29	28	389	1,270	.....	.....	359	389	72	10	28	190	24
30	28	389	1,090	.....	.....	491	331	170	10	28	100	21
31	28	.....	925	.....	.....	1,600	.....	151	.....	28	100	.....

Daily discharge, in second-feet, of Dix River near Burgin, Ky., for the years ending Sept. 30, 1913–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	21	151	190	.....	11,600	116	292	41	374	825	52	116
2	21	100	211	.....	5,600	100	292	36	491	2,590	292	190
3	21	100	211	.....	2,090	100	268	42	359	1,210	691	88
4	21	100	2,090	.....	1,400	85	268	38	305	1,340	438	75
5	21	100	3,130	.....	1,400	170	256	39	233	2,340	233	233
6	21	100	2,580	.....	3,130	2,500	244	92	92	1,730	180	1,030
7	21	85	2,020	.....	1,730	1,030	233	85	78	925	100	1,460
8	21	85	1,660	.....	1,150	568	222	72	151	5,820	72	735
9	825	85	1,530	.....	780	455	222	124	108	2,500	70	568
10	3,900	85	1,400	.....	529	305	222	100	160	925	142	405
11	1,460	85	1,030	1,600	405	268	222	92	100	1,030	1,600	331
12	1,030	85	649	6,870	359	222	421	88	82	925	2,420	280
13	649	85	568	4,100	305	190	389	85	62	6,150	735	244
14	11,100	50	421	2,170	268	200	331	75	55	1,870	256	200
15	12,300	42	331	1,030	256	151	305	58	92	825	170	151
16	7,480	42	280	735	608	389	268	52	1,730	529	735	100
17	6,880	42	491	925	292	233	233	52	735	318	491	67
18	6,270	42	529	1,460	244	305	211	58	331	268	825	46
19	4,200	42	529	2,950	211	455	211	55	256	200	455	34
20	2,950	42	6,270	1,800	170	345	211	50	1,150	233	359	27
21	1,030	42	4,300	1,270	170	455	151	41	1,090	200	780	35
22	608	42	2,420	1,210	151	421	133	62	1,270	160	925	36
23	491	42	1,400	4,400	133	455	133	244	568	124	825	34
24	359	28	1,340	2,250	160	568	133	455	405	78	825	35
25	305	28	4,000	1,400	170	825	133	825	305	55	925	34
26	305	28	2,950	1,090	170	608	124	359	151	45	491	34
27	256	28	1,400	780	142	529	78	3,900	116	36	200	31
28	211	28	.....	491	133	455	58	2,860	124	41	160	28
29	190	28	.....	649	.....	421	52	1,400	108	41	151	27
30	100	190	.....	421	.....	359	44	925	133	34	160	20
31	151	.....	.....	691	.....	345	.....	825	.....	41	133	.....
1915–16.												
1	4,940	46	233	.....	7,350	491	649	116	455	29	55	10
2	5,380	58	211	.....	2,590	1,340	491	100	233	27	44	35
3	1,270	70	200	.....	1,530	1,460	491	94	170	27	41	21
4	649	60	190	.....	1,030	925	405	108	108	20	44	35
5	4,940	58	180	.....	925	825	345	1,150	78	18	44	28
6	2,860	55	170	.....	780	735	268	389	72	14	36	20
7	975	52	151	.....	1,400	1,800	222	256	70	11	29	16
8	491	50	133	.....	925	2,020	925	190	331	15	35	14
9	305	52	124	.....	780	1,030	1,340	142	211	15	180	10
10	200	46	116	.....	1,340	735	925	100	142	10	190	10
11	233	47	124	.....	1,210	649	691	88	116	10	85	10
12	190	49	691	5,600	925	568	568	70	78	10	52	9.2
13	170	56	925	10,900	2,090	438	455	61	62	11	48	8
14	151	133	608	3,900	2,420	374	421	56	52	35	44	9.2
15	124	4,100	491	1,660	1,530	455	280	55	52	28	48	6.8
16	97	3,900	7,230	1,150	1,150	1,030	280	50	100	22	46	6
17	82	1,150	16,800	925	1,090	925	222	48	180	20	50	6
18	92	735	14,600	649	925	825	222	44	318	14	100	5.3
19	151	5,050	5,600	491	780	735	200	38	455	568	72	3.2
20	1,530	3,500	2,340	568	529	649	190	35	568	1,400	55	2.5
21	568	1,460	1,210	455	491	491	170	35	280	735	38	2.5
22	305	925	925	1,800	405	491	151	38	190	975	32	2.4
23	244	649	825	2,950	374	405	142	36	133	491	28	2.1
24	200	491	649	1,660	2,420	292	124	32	100	256	21	2
25	170	389	825	1,030	2,090	268	116	124	82	190	21	1.7
26	151	318	1,940	780	1,400	292	116	116	60	233	21	2.5
27	133	280	2,590	649	925	1,400	116	60	52	292	21	2.5
28	116	280	1,940	568	691	2,340	133	48	48	180	18	6.4
29	88	280	6,150	2,420	568	1,600	170	44	38	108	15	9.2
30	67	256	6,270	2,590	.....	1,030	142	52	34	108	12	19
31	54	.....	2,420	1,660	.....	1,150	.....	1,530	.....	78	10	.....

NOTE.—Gage washed out Jan. 10, 1913; gage heights were estimated by the observer Jan. 10 to Feb. 14, inclusive. Gage not read during January, 1914. Sept. 29, Oct. 17, and Dec. 6, 1914, discharge interpolated. Discharge estimated from record of flow of Licking River at Falmouth, Ky., Dec. 28–31, 1914, 1,300 second-feet; Jan. 1–10, 1915, at 1,170 second-feet, and Jan. 1–11, 1916, at 1,500 second-feet. These estimates are subject to considerable error, but the effect on the monthly and yearly means will not be great.

Monthly discharge of Dix River near Burgin, Ky., for the years ending Sept. 30, 1913–1916.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1912–13.					
October	41	15	24.3	0.062	0.07
November	327	15	108	.273	.30
December	6,000	50	787	1.99	2.29
January	27,400	1,150	7,000	17.72	20.43
February	25,900	331	949	2.40	2.50
March	25,700	305	2,940	7.44	8.58
April	975	85	344	.871	.97
May	1,940	60	462	1.17	1.35
June	1,800	21	279	.706	.79
July	116	2.5	20.3	.051	.06
August	190	1.5	28.2	.071	.08
September	1.5	1.5	1.5	.038	.004
The year	27,400	1.5	1,090	2.76	37.42
1913–14.					
October	151	2.5	27.1	.069	.08
November	608	28	191	.484	.54
December	1,870	170	639	1.62	1.87
February	9,170	491	1,690	4.28	4.46
March	6,750	280	925	2.34	2.70
April	2,250	280	740	1.87	2.09
May	10,900	28	943	2.39	2.76
June	735	10	69.5	.176	.20
July	305	2.5	34.4	.087	.10
August	825	28	181	.458	.53
September	4,100	21	481	1.22	1.36
1914–15.					
October	12,300	21	2,040	5.16	5.95
November	190	28	67.7	.171	.19
December	6,270	190	1,580	4.00	4.61
January	6,870	421	1,610	4.08	4.70
February	11,600	133	1,210	3.06	3.19
March	2,500	85	440	1.11	1.28
April	421	44	212	.537	.60
May	3,900	36	427	1.08	1.24
June	1,730	55	374	.947	1.06
July	6,150	34	1,080	2.73	3.15
August	2,420	52	513	1.30	1.50
September	1,460	20	223	.565	.63
The year	12,300	20	818	2.07	28.10
1915–16.					
October	5,380	54	869	2.20	2.54
November	5,050	46	820	2.08	2.32
December	16,800	116	2,480	6.28	7.24
January	10,900	.....	1,900	4.81	5.54
February	7,350	374	1,400	3.54	3.82
March	2,340	268	896	2.27	2.62
April	1,340	116	366	.927	1.03
May	1,530	32	171	.433	.50
June	568	34	162	.410	.46
July	1,400	10	192	.486	.56
August	190	10	49.5	.125	.14
September	35	1.7	10.5	.027	.03
The year	16,800	1.7	778	1.97	26.80

ELKHORN CREEK AT FORKS OF ELKHORN, KY.

LOCATION.—At footbridge at Forks of Elkhorn, Franklin County, about three-fourths mile below the forks of the stream and about 5 miles northeast of Frankfort.

DRAINAGE AREA.—415 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—April 26, 1915, to September 30, 1916.

GAGE.—Vertical staff in two sections on left bank; 0 to 5 feet attached to elm tree 40 feet below bridge, other section attached to sycamore tree about 20 feet below bridge; read by R. S. Estes.

DISCHARGE MEASUREMENTS.—Made from footbridge.

CHANNEL AND CONTROL.—Bed of stream loose and bedrock probably permanent. Control not located.

ICE.—Stage-discharge relation probably not affected by ice except during severe winters.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during record. Rating curve not yet determined. Gage read twice daily to tenths.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measurements of Elkhorn Creek at Forks of Elkhorn, Ky., 5 miles northeast of Frankfort, Ky., during the years ending Sept. 30, 1915, and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1915–16.		*Feet.*	*Sec.-ft.*
May 24	R. S. Durrell	3.06	960	Dec. 20	C. J. Thiebaud	5.87	3,500
27	do	3.09	979	June 19	do	7.45	5,200
June 11	Durrell and Thiebaud	2.40	498	19	do	7.95	5,800
1915–16.				19	do	8.05	6,000
Oct. 21	C. J. Thiebaud	1.95	284	July 14	do	1.40	200

Daily gage height, in feet, of Elkhorn Creek at Forks of Elkhorn, Ky., for the years ending Sept. 30, 1915, and 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1915.						1915.					
1	1.0	2.35	1.3	1.3	2.0	16	1.45	1.9	2.15	1.95	1.7
2	1.0	4.0	1.4	1.3	1.95	17	1.4	1.8	2.0	3.3	2.3
3	1.29	3.85	1.55	1.55	1.9	18	1.4	1.8	1.9	4.15	2.9
4	1.31	3.15	1.95	3.0	1.85	19	1.3	1.65	1.8	3.0	2.75
5	1.2	3.85	2.2	2.85	3.75	20	1.3	1.55	1.65	3.0	2.35
6	1.2	2.65	2.05	2.65	4.75	21	1.3	1.5	1.45	3.0	1.95
7	1.53	3.55	1.95	2.3	3.9	22	2.3	1.5	1.3	3.55	1.75
8	2.75	3.5	3.55	1.95	3.3	23	3.4	1.4	1.3	3.05	1.7
9	2.25	3.3	5.0	1.65	2.75	24	3.15	1.37	1.3	2.9	1.7
10	1.85	2.9	4.7	1.5	2.35	25	2.9	1.3	1.3	2.8	1.7
11	1.85	2.4	4.0	1.5	2.15	26	2.6	1.3	1.3	2.4	1.7
12	1.74	2.15	3.2	1.5	2.0	27	2.6	1.3	1.3	2.1	1.7
13	1.6	2.0	2.7	1.5	2.0	28	.....	1.3	1.3	2.0	1.7
14	1.5	2.0	2.45	1.5	1.9	29	2.95	1.3	1.3	2.0	1.7
15	1.5	2.0	2.3	3.0	1.8	30	2.7	1.25	1.3	2.3	1.7
						31	2.45	.....	1.3	2.15	.....

Daily gage height, in feet, of Elkhorn Creek at Forks of Elkhorn, Ky., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.75	1.5	2.0	4.5	6.9	2.65	2.75	1.4	1.0	1.25	1.0	0.8
2	5.1	1.5	2.0	4.45	5.75	2.5	2.55	1.4	1.0	1.1	1.0	.8
3	4.3	1.5	2.0	4.1	4.6	2.5	2.35	1.45	1.0	1.05	1.0	.8
4	3.3	1.5	2.0	3.7	3.85	2.35	2.15	1.8	1.0	.95	1.0	.8
5	2.8	1.5	2.0	3.65	3.4	2.2	1.95	1.65	1.0	.9	1.0	.8
6	2.45	1.5	2.0	3.9	3.15	2.1	1.75	1.5	1.8	.9	1.0	.8
7	2.25	1.5	2.0	3.55	2.95	4.05	1.6	1.5	2.55	.9	.9	.8
8	2.05	1.5	2.0	3.0	2.75	3.9	1.6	1.5	1.9	.9	.9	.8
9	2.0	1.5	2.0	3.0	2.55	3.35	1.75	1.45	1.45	.9	.8	.8
10	2.0	1.5	2.0	3.0	2.35	2.9	1.9	1.3	1.45	.9	.8	.8
11	1.9	1.5	2.0	4.8	2.3	2.55	1.7	1.3	1.6	.9	1.0	.8
12	1.8	1.5	2.05	8.2	2.4	2.35	1.5	1.3	2.0	.9	1.0	.8
13	1.7	1.5	2.15	9.7	6.25	2.25	1.5	1.25	1.7	.9	.9	.8
14	1.6	2.0	2.2	6.6	5.55	2.1	1.5	1.05	1.45	1.35	2.0	.8
15	1.5	3.7	2.2	5.05	4.4	3.8	1.5	.85	1.7	1.3	3.6	.8
16	1.5	4.0	3.6	4.35	4.05	3.0	1.5	.8	1.75	1.05	2.45	.8
17	1.5	3.3	11.6	3.55	4.0	3.0	1.5	.8	1.9	1.0	1.6	.8
18	1.5	3.05	11.85	3.0	3.9	2.9	1.5	.8	1.65	1.0	1.0	.8
19	1.55	5.5	7.95	2.65	3.45	2.75	1.5	.8	7.4	4.75	.9	.8
20	1.6	5.35	5.95	2.45	3.15	2.6	1.5	.8	6.35	2.8	.9	.8
21	1.5	4.25	4.75	2.25	2.8	2.5	1.5	.8	4.25	2.7	.8	.8
22	1.5	3.5	3.9	3.8	2.55	2.4	1.5	.8	3.3	2.35	1.35	.8
23	1.5	3.1	3.5	3.55	2.45	2.3	1.5	.8	2.7	2.15	1.0	.8
24	1.5	2.85	3.05	3.25	3.05	2.15	1.5	.8	2.45	1.45	1.0	.8
25	1.5	2.65	5.05	3.15	4.1	2.0	1.5	.8	2.2	1.2	.9	.8
26	1.5	2.45	4.2	2.95	3.9	2.2	1.5	.8	1.9	1.5	.9	.8
27	1.5	2.25	3.75	2.75	3.45	3.9	1.5	.8	1.8	1.2	.8	.8
28	1.5	2.2	4.05	2.55	2.95	3.9	1.4	.8	1.75	1.2	.8	.85
29	1.5	2.1	6.75	3.95	2.85	3.6	1.4	.8	1.55	1.05	.8	1.1
30	1.5	2.0	6.8	8.3	.....	3.25	1.4	1.0	1.35	1.0	.8	.85
31	1.5	.....	5.2	7.65	.....	2.95	.....	1.0	.....	1.0	.8	.....

NOTE.—May 28 no reading reported.

EAGLE CREEK AT GLENCOE, KY.

LOCATION.—At county highway bridge one-half mile south of Glencoe, Gallatin County.

DRAINAGE AREA.—445 square miles (United States Engineer Corps).

RECORDS AVAILABLE.—April 29, 1915, to September 30, 1916.

GAGE.—Vertical staff attached to upstream side of first pier from left abutment of bridge; read by Anna Connelly.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed of stream sand and loose stone, probably permanent. Small island covered with trees about 250 feet below bridge. Position of control not known.

ICE.—Stage-discharge relation probably not affected by ice except in severe winters.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during record. Rating curve well defined between 25 and 15,000 second-feet; beyond these limits the curve is an extension. Gage read twice daily to tenths. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Base data furnished by United States Engineer Corps.

Discharge measureents of Eagle Creek near Glencoe, Ky., during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1916.		*Feet.*	*Sec.-ft.*
Apr. 29	R. S. Durrell	0.90	30	June 20	C. J. Thiebaud	5.61	2,080
May 21	do	1.62	90	June 20	do	4.73	1,500
May 29	do	4.14	1,020				
July 8	C. J. Thiebaud	12.7	10,900				
July 9	do	6.2	2,830				

Daily discharge, in second-feet, of Eagle Creek near Glencoe, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1915.						1915.					
1		183	204	2,010	66	16	51	870	85	532	58
2		2,190	164	146	54	17	45	260	532	214	51
3		1,660	248	115	51	18	45	155	173	214	80
4	300	488	130	173	51	19	45	300	146	236	930
5	173	260	532	115	3,830	20	45	3,830	80	260	225
6	130	183	314	130	4,740	21	102	1,130	58	1,350	173
7	193	155	138	75	670	22	138	300	54	810	90
8	510	695	11,200	54	1,060	23	2,580	173	48	330	62
9	260	225	1,750	42	260	24	645	130	42	362	58
10	146	96	362	40	164	25	400	102	38	2,480	51
11	108	115	9,290	40	155	26	1,420	70	30	214	45
12	85	90	750	40	155	27	420	54	26	90	40
13	75	80	300	40	96	28	314	48	26	66	40
14	66	75	214	35	58	29	870	45	26	66	35
15	54	1,060	102	108	58	30	362	45	22	510	35
						31	260		22	138	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916-17.												
1	138	30	58	810	3,720	193	248	115	164	42	30	40
2	1,350	30	58	2,580	870	225	214	96	90	40	30	442
3	330	30	58	810	362	400	225	115	670	40	26	442
4	155	26	58	330	260	260	214	178	130	38	22	155
5	1,200	26	58	260	236	260	193	380	62	35	22	85
6	193	26	58	810	750	1,060	155	204	164	30	20	66
7	85	26	58	750	722	6,890	155	130	465	26	18	225
8	58	26	54	286	362	1,200	214	115	695	22	18	58
9	58	26	51	260	248	380	810	90	248	22	18	58
10	51	32	51	930	214	260	532	80	155	20	22	48
11	45	30	48	6,510	204	225	330	66	622	18	24	40
12	40	102	75	9,850	1,060	204	236	66	248	18	26	28
13	40	80	400	7,280	7,280	193	214	58	173	18	38	26
14	40	164	345	1,200	1,350	193	164	54	130	18	45	26
15	40	3,300	173	345	695	5,420	183	51	90	18	45	26
16	66	1,060	465	345	330	1,350	155	45	96	14	35	22
17	58	214	21,600	214	1,060	670	155	51	532	173	96	22
18	62	155	8,200	193	1,280	465	130	51	930	66	70	22
19	51	5,900	930	155	645	380	122	45	4,620	62	48	22
20	51	2,010	362	204	362	300	130	45	2,010	532	40	18
21	80	1,500	225	273	273	286	286	45	2,980	1,660	54	18
22	102	183	214	1,350	236	260	155	51	420	532	42	18
23	85	155	173	1,350	236	204	115	85	204	173	40	14
24	70	122	155	380	3,610	183	108	66	164	130	35	11
25	54	108	5,200	286	1,840	173	96	62	138	80	30	11
26	45	85	1,580	248	488	510	138	58	90	66	30	11
27	45	85	442	236	286	3,500	173	45	80	66	28	11
28	40	75	2,580	260	225	930	164	42	75	45	35	11
29	40	75	7,150	2,580	214	465	155	42	66	40	54	12
30	35	75	4,620	13,500		380	138	810	58	35	40	9
31	35		930	4,050		300		314		30	30	

Monthly discharge of Eagle Creek near Glencoe, Ky., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 445 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
May 4-31	2,580	45	352	.791	.82
June	3,830	45	502	1.13	1.26
July	11,200	22	874	1.96	2.26
August	2,480	35	356	.800	.92
September	4,740	35	448	1.01	1.13
1915-16.					
October	1,350	35	153	.344	.40
November	5,900	26	525	1.18	1.32
December	21,600	48	1,820	4.09	4.72
January	13,500	155	1,890	4.25	4.90
February	7,280	204	1,010	2.27	2.45
March	6,890	173	894	2.01	2.32
April	810	96	210	.472	.53
May	810	42	118	.265	.31
June	4,620	58	552	1.24	1.38
July	1,660	14	133	.299	.34
August	96	18	35.8	.080	.09
September	442	9	66.6	.150	.17
The year	21,600	9	619	1.39	18.93

GREEN RIVER BASIN.

GREEN RIVER AT MUNFORDVILLE, KY.

LOCATION.—At the toll highway bridge at Munfordville, Hart County. The Louisville & Nashville Railroad bridge is about a mile below the highway bridge.

DRAINAGE AREA.—1,790 square miles (measured on scale 1:500,000, map of Kentucky), prepared by United States Geological Survey.

RECORDS AVAILABLE.—February 27, 1915, to September 30, 1916.

GAGE.—Chain gage attached to upstream handrail of bridge; read by Chester Williams.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading 100 feet below the bridge.

CHANNEL AND CONTROL.—The control for low stages is at a riffle used as a ford immediately below the bridge and is believed to be permanent; control at high stages is also believed to be permanent. Discharge relation may be affected to some extent at high stages by differences in the foliage on the brush and trees in the flood plain.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 44.48 feet at 5.20 a. m. December 18 (discharge, 42,400 second-feet); minimum stage, 2.83 feet at 5.10 a. m. and 5 p. m. September 30 (discharge, 144 second-feet).

Highest known stage about 54 feet; date unknown.

ICE.—Ice seldom forms at this station.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year Rating curve well defined below and fairly well defined above 1,700 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good.

COOPERATION.—Station maintained in cooperation with the Kentucky Geological Survey, J. B. Hoeing, State geologist.

The following discharge measurements were made during the year:

April 28, 1916, by A. H. Horton: Gage height, 4.09 feet; discharge, 1,100 second-feet.

September 8, 1916, by B. E. Jones: Gage height, 3.06 feet; discharge, 271 second-feet.

Daily discharge, in second-feet, of Green River at Munfordville, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915.							
1	750	1,200	389	2,620	2,020	389	525
2	750	1,120	389	2,480	2,480	1,120	505
3	600	975	421	2,920	2,020	2,400	490
4	525	938	1,120	2,400	1,720	1,050	460
5	750	825	1,280	1,720	2,700	1,050	335
6	2,180	788	750	1,880	3,000	862	3,150
7	3,450	788	1,420	2,180	2,850	675	4,720
8	3,220	750	3,380	3,220	2,320	562	3,300
9	2,250	712	2,320	3,220	2,020	468	1,650
10	1,720	675	1,420	3,080	1,580	421	1,200
11	1,420	600	1,120	1,800	4,280	421	975
12	1,200	975	862	1,650	5,320	2,020	825
13	1,120	1,280	750	1,800	6,040	1,120	675
14	1,050	1,350	675	1,800	6,360	788	600
15	1,050	1,200	562	3,980	5,640	1,420	525
16	975	900	468	9,000	3,900	975	482
17	1,050	788	445	7,120	1,880	975	825
18	1,350	750	397	4,050	3,220	1,120	482
19	1,580	712	328	5,880	1,720	1,420	562
20	1,420	675	397	9,160	1,500	1,350	421
21	1,420	638	381	8,660	1,420	3,150	389
22	1,500	638	1,720	13,300	1,120	2,620	562
23	2,480	638	6,620	11,300	1,050	2,620	512
24	1,880	600	13,200	6,530	825	1,720	405
25	2,320	562	9,440	3,450	675	1,280	389
26	2,550	562	3,750	2,100	600	975	312
27	2,480	505	3,980	1,580	562	825	328
28	2,100	482	3,600	1,420	505	712	342
29	1,800	429	3,600	1,880	482	600	282
30	1,580	429	3,000	2,850	429	638	600
31	1,350	.....	3,750	.....	413	638	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	6,700	562	1,580	14,600	5,560	2,620	4,280	1,200	6,870	413	562	305
2	10,600	562	1,420	12,200	14,300	3,750	4,950	1,200	3,000	445	498	750
3	11,700	525	1,350	13,800	12,600	5,480	4,580	1,050	1,720	373	475	900
4	5,640	468	1,280	15,500	15,000	5,320	2,100	3,520	1,200	468	373	562
5	7,460	490	1,280	11,400	7,300	4,580	1,950	5,020	975	675	312	525
6	11,200	482	1,200	7,300	4,880	3,150	1,720	4,880	788	562	328	350
7	11,300	445	1,050	5,320	4,050	3,900	2,320	3,080	1,280	712	312	282
8	4,420	460	975	5,100	3,820	6,040	1,720	1,950	1,420	397	282	282
9	2,100	505	975	10,600	3,900	6,280	2,850	1,950	1,350	350	222	260
10	1,580	562	900	11,100	3,600	4,580	3,820	1,280	1,350	2,480	252	230
11	1,280	525	900	7,640	4,720	3,600	3,380	1,120	900	1,580	245	215
12	1,120	638	1,200	6,280	6,280	3,000	2,780	938	788	1,120	397	189
13	1,120	1,050	2,550	15,900	5,100	2,550	2,320	788	1,420	1,200	750	163
14	975	1,580	3,820	22,900	4,650	2,250	2,020	675	975	1,050	525	176
15	825	10,700	3,150	26,700	5,400	2,620	1,880	712	788	862	437	182
16	600	15,900	6,870	24,600	5,020	4,050	1,580	675	825	600	3,750	413
17	712	17,300	22,900	13,300	4,280	4,650	1,880	675	1,720	675	16,200	245
18	750	10,200	38,700	6,440	3,900	4,120	1,950	638	2,020	1,580	7,550	260
19	1,050	14,500	37,700	4,650	3,150	3,680	1,650	600	1,880	975	2,550	230
20	1,880	16,700	35,500	3,380	2,780	3,150	1,500	562	1,720	1,050	1,500	208
21	2,480	16,400	26,900	3,080	2,400	2,400	1,720	562	1,500	2,320	1,050	176
22	2,020	8,820	9,720	2,920	2,100	2,180	1,720	525	1,050	4,050	788	202
23	1,420	4,500	5,100	3,680	2,020	2,250	1,500	562	900	5,180	600	176
24	1,200	3,300	3,980	8,230	2,920	1,950	1,280	562	825	1,580	525	600
25	975	2,550	4,420	9,160	5,400	1,800	1,120	525	750	1,050	490	222
26	975	2,180	7,550	6,620	5,800	1,720	975	562	675	900	429	182
27	825	2,100	8,660	4,720	4,500	3,980	1,050	562	562	900	421	118
28	788	2,250	7,210	3,820	3,600	5,800	1,050	512	525	1,120	397	1,200
29	712	2,020	11,400	3,300	3,000	9,340	1,120	512	505	1,120	320	4,200
30	1,420	1,800	17,900	3,750	.....	7,460	1,200	3,080	445	900	290	1,580
31	638	.....	17,000	4,720	.....	4,420	.....	8,320	.....	638	275	.....

NOTE.—Jan. 1, 1916, no gage height reported. Discharge interpolated.

Monthly discharge of Green River at Munfordville, Ky., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 1,790 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
March	3,450	525	1,610	0.899	1.04
April	1,350	429	783	.432	.49
May	13,200	328	2,320	1.30	1.50
June	13,300	1,420	4,170	2.33	2.60
July	6,360	420	2,280	1.27	1.46
August	3,150	389	1,170	.654	.75
September	4,720	282	894	.499	.56
1915–16.					
October	11,700	600	3,110	1.74	2.01
November	17,300	445	4,670	2.61	2.91
December	38,700	900	9,200	5.14	5.93
January	26,700	2,920	9,440	5.27	6.08
February	15,000	2,020	5,240	2.93	3.16
March	9,340	1,720	3,960	2.21	2.55
April	4,950	975	2,130	1.19	1.33
May	8,320	518	1,570	.877	1.01
June	6,870	445	1,360	.760	.85
July	5,180	350	1,200	.670	.77
August	16,200	222	1,390	.777	.90
September	4,200	118	513	.287	.32
The year	38,700	118	3,660	2.04	27.82

WABASH RIVER BASIN.

VERMILION RIVER NEAR DANVILLE, ILL.

LOCATION.—In sec. 22, T. 19 N., R. 11 W., at the Chicago & Eastern Illinois Railroad bridge about 3 miles south of Danville, Vermilion County, 1¾ miles above Stony Creek and 3 miles below mouth of North Fork.

DRAINAGE AREA.—1,280 square miles.

RECORDS AVAILABLE.—November 12, 1914, to September 30, 1916.

GAGE.—Chain gage attached to downstream side of bridge; read by Ralph Bradbury.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Soft mud and sand; likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1915–16, 18.9 feet at 4 p. m. January 31 (discharge, 12,800 second-feet); minimum stage 2.11 feet at 7 a. m. August 31 (discharge, 11 second-feet).

ACCURACY.—Stage-discharge relation not permanent: affected by ice and changed during the winter. Rating curve used till January 1 fairly-well defined between 10 and 10,000 second-feet; curve used after that date fairly well defined between 35 and 10,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating tables. Results fair except for extreme high and low stages and for periods affected by ice, when they are poor.

The following discharge measurements were made by H. C. Beckman:

August 16, 1915: Gage height, 2.63 feet; discharge, 67.9 second-feet; August 16, 1916: Gage height, 2.63 feet; discharge, 67.5 second-feet.

Daily discharge, in second-feet, of Vermilion River near Danville, Ill., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	985	140	118		10,900		662	364	1,390	364	43	15
2	930	146	105		9,920		715	364	1,180	364	40	19
3	876	134	85		7,680		769	386	1,060	321	38	18
4	594	129	71		4,080		824	409	532	300	33	16
5	408	123	73		2,240	400	824	364	584	280	33	16
6	326	123	83				940	364	662	260	31	19
7	287	123	88				940	342	715	203	28	24
8	250	118	93				880	342	769	167	26	45
9	232	107	102				880	342	824	164	28	51
10	268	105	134				824	342	824	153	33	44
11	287	112	218			662	824	342	824	153	35	42
12	268	174	232			662	880	386	824	160	35	42
13	287	187	222			715	940	880	824	167	31	39
14	287	158	204	3,360		769	1,000	1,060	1,000	185	28	35
15	268	137	180			769	940	3,920	1,180	167	31	24
16	232	123	200			824	940	3,760	769	153	28	17
17	218	112	225			824	940	3,440	824	133	26	19
18	306	158	250		650	824	880	2,720	940	116	26	17
19	387	250	250			824	880	2,080	880	98	24	18
20	408	211				824	940	1,390	769	87	24	18
21	346	197				824	940	1,100	880	100	24	19
22	287	190				769	940	1,120	1,120	92	22	18
23	250	184				769	940	1,120	1,120	75	22	16
24	222	171				715	880	1,060	880	68	21	16
25	177	161	390			715	824	1,060	769	68	19	18
26	134	158		2,280		715	715	1,000	715	61	17	18
27	118	152		2,360		715	662	1,060	715	56	16	26
28	118	152		4,880		715	558	1,120	715	51	15	40
29	123	146		7,760		715	457	1,250	610	48	15	33
30	134	140		10,200	.....	715	409	1,600	433	44	12	24
31	140	.....		12,500	.....	662	.....	1,600	.....	44	11	.....

NOTE.—Discharge Dec. 20 to Jan. 25 and Feb. 6 to Mar. 10 estimated, because of ice, from gage heights and weather records. Braced figures show mean daily discharge for the period indicated.

Monthly discharge of Vermilion River near Danville, Ill., for the year ending Sept. 30, 1916

[Drainage area, 1,280 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	985	118	328	0.256	0.30
November	250	105	151	.118	.13
December	.....	71	246	.192	.22
January	12,500	.....	4,000	3.12	3.60
February	10,900	.....	1,740	1.36	1.47
March	824	.....	636	.497	.57
April	1,000	409	825	.645	.72
May	3,920	342	1,190	.930	1.07
June	1,390	433	844	.659	.74
July	364	44	152	.119	.14
August	43	11	26.3	.021	.02
September	51	15	25.5	.020	.02
The year	12,500	11	846	.661	9.00

EMBARRASS RIVER AT STE. MARIE, ILL.

LOCATION.—In sec. 30, T. 6 N., R. 14 W., at highway bridge at north end of Main Street, Ste. Marie, Jasper County, about 450 feet downstream from Cincinnati, Hamilton & Dayton Railway bridge and 2½ miles upstream from mouth of Hickory (or North Fork) Creek.

DRAINAGE AREA.—1,540 square miles.

RECORDS AVAILABLE.—October 20, 1909, to December 31, 1912; August 24, 1914, to September 30, 1916.

GAGE.—Chain gage attached to bridge; read by V. C. Wuerth.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge at ordinary stages; during high water made also from downstream side of five wooden trestles on Cincinnati, Hamilton & Dayton Railway bridge, northwest of highway bridge.

CHANNEL AND CONTROL.—Measuring section is at a pool; control is about 1,800 feet below gage; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.1 feet at 11 a. m. February 1 (discharge not determined because of backwater from ice); maximum stage recorded during open-water periods of year, 20 feet at 3 p. m. January 31 (discharge, 6,320 second-feet); minimum stage, 1.59 feet September 23 and 27 (discharge, 26 second-feet).

Flood of spring of 1908 reached a height of 22.5 feet on the present gage. Minimum stage recorded during periods of records, 1.1 feet September 5 to 9, 1914, and October 19, 1914 (discharge, 1 second-foot).

ACCURACY.—Stage-discharge relation probably permanent throughout the year; seriously affected by ice during the winter. Rating curve fairly well defined between 22 and 1,800 second-feet. Gage read to hundredths once daily. Gage height record during parts of October, November, and December unreliable. Daily discharge ascertained by applying daily gage heights to rating table. Records poor for October 1 to February 19, inclusive, and good for the remainder of the year.

Discharge measurements of Embarrass River at Ste. Marie, Ill., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 24	W. G. Hoyt	8.41	1,230
Sept. 22	H. C. Beckman	1.66	28.0
22	do	1.66	28.8

Daily discharge, in second-feet, of Embarrass River at Ste. Marie, Ill., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	412	83	234			1,080	720	290	720	484	66	35
2	412	83	234			950	678	290	742	448	62	40
3	412	83	234			902	720	306	617	394	58	35
4	242	82	234			855	742	340	520	340	57	35
5	242	82	234			832	678	340	448	290	57	35
6	242	80	234			786	764	340	558	274	53	35
7	242	80	86			950	720	306	720	250	50	35
8	242	80	86			1,340	678	290	878	218	49	35
9	234	80	84			1,110	520	274	809	218	49	35
10	234	80	84		2,750	950	520	274	720	188	46	173
11	234	82	84			878	502	258	539	173	45	86
12	234	226	2,620			855	484	250	394	173	43	58
13	234	720	2,220	4,130		832	484	242	376	166	45	56
14	234	242	1,490			809	466	234	242	159	45	46
15	234	242	1,200			809	448	234	430	173	46	42
16	234	234	2,220			809	430	290	577	173	58	35
17	86	234	3,720			786	412	394	502	138	110	34
18	242	242	4,700			786	412	466	809	131	166	34
19	617	637	3,720			657	78	502	1,370	117	93	32
20	242	1,840	2,220		1,880	657	376	394	637	117	73	30
21	242	1,430	1,430		2,020	637	376	394	2,060	124	58	30
22	234	1,160	1,160		1,910	617	394	376	4,660	242	68	29
23	234	720	1,160		2,260	617	394	340	3,580	188	274	26
24	234	430	878		2,950	597	376	242	1,060	124	166	28
25	234	242	878		2,420	597	358	242	809	117	80	26
26	234	242	1,160	3,940	2,060	950	340	234	617	104	63	26
27	86	234	1,460	3,720	1,840	1,490	340	234	597	91	59	26
28	86	234		4,210	1,700	1,250	323	234	577	84	58	27
29	84	234	1,370	4,700	1,430	1,160	323	234	577	80	42	28
30	84	234		5,720	.....	102	306	412	502	77	36	30
31	84	.....		6,320	.....	855	.....	539	.....	67	35	.....

NOTE.—Gage-height record during parts of October, November, and December unreliable. Discharge Dec. 28 to Jan. 25, and Feb. 1–19, estimated, because of ice, from gage heights, and weather records. Braced figures show mean daily discharge for the periods indicated.

Monthly discharge of Embarrass River at Ste. Marie, Ill., for the year ending Sept. 30, 1916.

[Drainage area, 1,540 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	412	84	237	0.154	0.18
November	1,840	80	356	.231	.26
December	4,700	84	1,280	.831	.96
January	6,320	.....	4,250	2.76	3.18
February	.....	.....	2,500	1.62	1.75
March	1,490	597	881	.572	.66
April	764	78	479	.311	.35
May	539	234	316	.205	.24
June	4,660	242	922	.599	.67
July	484	67	191	.124	.14
August	274	35	71.3	.046	.05
September	173	26	40.7	.026	.03
The year	6,320	26	958	.622	8.47

WEST BRANCH OF WHITE RIVER NEAR NOBLESVILLE, IND.

LOCATION.—At the steel highway bridge, known as Conners Bridge, about 4½ miles north of Noblesville, Hamilton County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 13, 1915, to September 30, 1916.

GAGE.—Chain gage attached to upstream side of bridge; read by Marvin Scearce.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Coarse sand and gravel, strewn with boulders; probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 15 feet at 7.15 a. m. February 1; minimum stage, 1.30 feet about 5 p. m. September 22.

ICE.—State-discharge relation affected by ice during severe winters.

ACCURACY.—State-discharge relation probably permanent, probably affected by ice January 16–20. No gage reading reported January 16 and 18. Rating curve not determined. Gage read twice daily to hundredths.

COOPERATION.—Records furnished by Noblesville Heat, Light & Power Co., Noblesville, Ind.

No measurements made at this station by engineers of Survey during the year.

Daily gage height, in feet, of West Branch of White River at Noblesville, Ind., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.68	1.99	2.48	4.15	14.50	2.77	4.15	2.64	2.60	2.39	1.51	1.55
2	2.62	1.97	2.44	10.62	10.72	2.67	3.62	2.54	2.49	3.34	1.48	1.52
3	2.62	1.90	2.38	13.46	5.75	2.63	3.50	2.60	2.45	3.29	1.46	1.47
4	2.45	1.86	2.35	10.66	4.30	2.39	3.47	2.96	2.60	3.19	1.53	1.45
5	2.32	1.86	2.28	6.70	4.12	2.41	3.21	3.08	2.78	3.13	1.68	1.47
6	2.27	1.88	2.22	6.65	4.10	2.72	3.23	2.90	2.93	3.03	1.75	1.52
7	2.14	1.84	2.17	5.12	3.52	3.18	3.15	3.15	4.88	1.96	1.68	1.85
8	2.07	1.85	2.15	4.07	3.36	3.70	2.94	3.32	5.70	1.92	1.65	1.58
9	2.08	1.82	2.15	4.05	3.19	3.21	2.81	4.75	4.53	1.91	1.89	1.60
10	1.94	1.82	2.12	3.80	2.50	3.09	2.76	4.45	4.20	1.84	2.00	1.50
11	1.91	1.81	2.11	4.02	2.60	3.02	2.74	3.58	3.93	1.84	2.08	1.51
12	1.87	2.04	2.13	5.58	2.64	2.91	2.72	3.16	3.50	1.83	2.26	1.42
13	1.86	2.12	2.19	7.95	3.70	2.76	2.65	2.84	3.14	1.81	1.94	1.37
14	2.30	2.12	2.03	7.80	3.25	2.83	2.56	3.10	3.03	1.94	1.77	1.41
15	3.20	2.06	2.31	4.88	3.21	2.86	2.51	2.91	3.24	2.14	1.72	1.37
16	3.22	2.01	2.14	.....	3.50	2.76	2.44	2.79	3.11	1.94	1.65	1.34
17	2.90	1.91	2.51	3.48	3.26	2.75	2.42	2.60	3.07	1.81	1.58	1.38
18	3.00	2.05	4.03	.....	3.55	2.65	2.39	2.47	3.04	1.81	2.48	1.36
19	4.18	4.58	4.02	6.35	3.50	2.64	2.38	2.35	3.11	1.84	2.12	1.37
20	3.62	5.54	3.41	6.85	3.25	2.60	2.41	2.26	2.89	1.80	1.73	1.35
21	3.31	4.82	2.55	6.15	3.09	2.62	2.53	2.26	4.70	2.21	1.61	1.32
22	3.24	4.02	3.01	5.30	2.99	2.64	2.74	2.41	5.26	2.54	1.56	1.31
23	2.88	3.62	2.63	5.10	3.21	3.25	2.80	2.93	5.08	1.97	2.53	1.32
24	2.51	3.30	2.52	4.45	3.70	3.55	2.69	2.77	3.96	1.79	2.48	1.32
25	2.38	3.03	2.65	3.70	3.85	3.70	2.59	2.42	2.81	1.74	2.28	1.35
26	2.30	2.84	3.98	3.65	3.75	3.52	2.55	2.29	2.89	1.67	1.88	1.25
27	2.22	2.75	3.44	3.68	3.24	6.50	2.66	2.27	2.95	1.64	2.30	1.40
28	2.17	2.72	3.45	4.70	3.08	7.45	2.88	2.22	2.77	1.49	1.89	1.48
29	2.05	2.69	3.36	5.40	2.88	7.08	2.91	2.38	2.58	1.53	1.84	1.47
30	2.06	2.49	3.45	9.32	.....	5.68	2.88	2.92	2.50	1.52	1.66	1.48
31	1.99	.....	2.70	13.76	.....	4.52	.....	3.13	.....	1.52	1.59	.....

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

LOCATION.—At highway bridge between East Shoals and West Shoals, Martin County, a short distance above the Baltimore & Ohio Southwestern Railroad bridge.

DRAINAGE AREA.—4,900 square miles.

RECORDS AVAILABLE.—June 25, 1903, to July 21, 1906; October 12, 1908, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to bridge, read by G. M. Freeman.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Solid rock; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 32.0 feet February 4 (discharge, 59,600 second-feet); minimum stage, 2.1 feet at 7 a. m. November 1 (discharge, 320 second-feet).

The flood of March–April, 1913, reached a stage of 42.2 feet at 7 a. m. March 28; maximum gage height as published by the United States Weather Bureau prior to 1913, 34.1 feet, March 30, 1904; flood of March, 1907, said to have been 1 to 1½ feet higher.

ICE.—Stage-discharge relation affected by ice during parts of January and February in severe winters; in ordinary winters there is little, if any, ice at the station.

REGULATION.—Flow at low stages is probably affected by a water-power plant near Bedford.

ACCURACY.—Stage-discharge relation practically permanent; probably not affected by ice during year. Rating curve well defined to 40,000 second-feet; above this discharge the rating curve is based on one discharge measurement made in March, 1904, at 34.2 feet gage height. There is a possibility that the rating curve for this station above low stages may be in error as no discharge measurements above low stages have been made since 1911, and the flood of March-April, 1913, may have changed the stage-discharge relation at medium and high stages. Gage read once daily to tenths from January 1 to June 30 and twice daily to tenths remainder of year. Daily discharge ascertained by applying gage heights to rating table. Results are considered good.

COOPERATION.—Gage-height records furnished by the United States Weather Bureau during part of year.

No discharge measurements were made at this station during the year.

Daily discharge, in second-feet, of East Branch of White River at Shoals, Ind., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	830	345	2,420	23,000	36,500	5,910	10,500	9,670	3,980	3,000	1,040	1,040
2	1,740	1,100	1,660	26,600	38,000	4,970	8,160	8,380	4,970	3,730	1,100	1,160
3	1,040	880	1,660	27,800	47,300	4,730	7,280	6,600	5,210	4,970	1,100	1,500
4	1,660	830	1,660	27,800	59,600	4,230	6,140	6,370	3,980	5,680	985	1,500
5	1,740	830	1,500	28,600	53,600	3,980	6,140	7,940	4,970	3,980	880	1,500
6	1,040	880	1,360	28,700	40,800	4,480	6,600	9,460	5,450	4,230	830	1,040
7	1,220	695	1,100	28,200	40,300	6,600	6,140	9,040	7,500	3,980	830	930
8	930	650	1,220	27,200	34,200	13,000	5,210	7,280	9,670	3,730	830	985
9	930	740	1,160	23,800	22,100	15,400	4,730	5,910	11,100	1,820	1,100	985
10	1,100	785	1,220	17,000	12,100	15,700	4,970	5,450	10,700	2,000	1,360	880
11	785	880	1,220	13,400	7,720	14,300	5,210	4,970	11,100	1,740	1,740	785
12	785	695	2,100	23,800	7,060	12,500	5,450	4,730	10,900	1,660	3,000	880
13	880	785	2,880	30,500	9,670	10,500	5,210	4,480	9,040	1,740	2,000	985
14	880	695	3,240	31,400	14,700	7,060	3,240	3,730	7,500	2,100	1,500	880
15	785	785	3,240	32,000	17,400	5,910	3,730	3,730	6,370	3,000	1,660	610
16	785	785	4,230	33,500	17,300	5,680	3,480	3,000	5,450	2,000	1,580	535
17	740	785	19,880	36,500	15,600	6,370	3,730	2,760	5,680	1,360	1,360	610
18	880	880	19,700	37,100	14,000	6,140	3,240	2,530	5,210	1,220	1,360	650
19	930	1,740	19,800	35,000	12,500	5,910	2,760	2,310	8,820	1,290	1,580	570
20	880	3,980	20,300	28,600	12,300	5,680	2,760	2,100	8,820	2,200	1,500	610
21	880	6,600	22,000	19,700	11,500	5,210	10,300	2,100	12,900	3,000	1,360	610
22	1,360	7,940	22,100	16,000	11,300	4,730	15,000	2,310	18,200	4,730	1,220	610
23	2,530	7,500	19,700	17,800	7,940	4,230	16,500	1,910	15,900	5,910	985	610
24	830	5,680	17,600	18,800	7,500	3,730	19,100	1,580	14,900	5,450	985	535
25	1,580	4,730	15,000	20,200	8,160	3,480	20,400	1,740	12,700	3,480	785	430
26	985	3,730	13,800	20,600	9,880	6,140	17,300	1,430	11,500	2,640	740	610
27	1,290	2,760	12,100	18,800	9,670	5,450	13,600	1,740	8,380	2,200	880	610
28	985	2,310	12,300	17,000	8,600	8,820	11,100	1,740	5,680	1,580	1,040	610
29	1,100	2,200	14,700	15,600	6,600	11,700	10,500	1,740	4,480	1,740	1,290	650
30	985	2,200	23,300	24,800	.....	12,100	10,300	2,530	3,730	1,220	985	650
31	1,360	.....	23,600	33,500	.....	11,700	.....	2,760	.....	1,040	985	.....

Monthly discharge of East Branch of White River at Shoals, Ind., for the year ending Sept. 30, 1916.

[Drainage area, 4,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	2,530	740	1,110	0.227	0.26
November	7,940	345	2,180	.445	.50
December	23,600	1,100	9,600	1.96	2.26
January	37,100	13,400	25,300	5.16	5.95
February	59,600	6,600	20,700	4.22	4.55
March	15,700	3,480	7,620	1.56	1.80
April	20,400	2,760	8,290	1.69	1.89
May	9,670	1,430	4,260	.869	1.00
June	18,200	3,730	8,490	1.73	1.93
July	5,910	1,040	2,850	.582	.67
August	3,000	740	1,240	.253	.29
September	1,500	430	819	.167	.19
The year	59,600	345	7,660	1.56	21.29

LITTLE WABASH RIVER AT WILCOX, ILL.

LOCATION.—In the SW. ¼ sec. 3, T. 2 N., R. 8 E., at highway bridge at Wilcox, Clay County, about 6 miles southeast of Clay City, and about a quarter of a mile below the mouth of Big Muddy Creek.

DRAINAGE AREA.—1,130 square miles.

RECORDS AVAILABLE.—August 22, 1914, to September 30, 1916.

GAGE.—Chain gage attached to bridge; read by Hugh Holman.

DISCHARGE MEASUREMENTS.—At ordinary stages made from downstream side of bridge, which is at a pool; during high water made also from bridge across drainage ditch and overflow section about half a mile east of the highway bridge.

CHANNEL AND CONTROL.—Heavy clay, probably permanent; control section is about 100 feet below the bridge. Soundings made August 22, 1914, indicate that there would be no flow past the gage if the stage were to fall to about 1.2 feet ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 24.9 feet at 7 a. m. February 1 (discharge, 8,640 second-feet); minimum stage, 1.92 feet at 6 a. m. September 27 (discharge, 7.4 second-feet).

1914–1916: Maximum stage prevailed August 22, 1915 (gage inaccessible, discharge estimated as 10,000 second-feet); minimum stage recorded, 1.70 feet August 23, 1914 (discharge, 4 second-feet).

ACCURACY.—Stage-discharge relation practically permanent; probably affected by ice during short periods in January and February. Rating curve well defined between 31 and 420 second-feet, fairly well defined below 31 second-feet and between 420 and 3,360 second-feet, and poorly defined above 3,360 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Results good, except for very high stages; determination greater than 6,000 second-feet subject to considerable error.

Discharge measurements of Little Wabash River at Wilcox, Ill., during the year ending Sept. 30, 1916.

[Made by H. C. Beckman.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 11	4.92	261
Sept. 21	2.01	8.7
21	2.01	9.7

Daily discharge, in second-feet, of Little Wabash River at Wilcox, Ill., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	76	33	63	2,820	8,640	361	452	108	452	184	24	22
2	76	32	60	3,700	6,610	308	361	103	232	134	22	28
3	71	30	56	4,140		319	308	98	161	118	19	26
4	89	30	56	4,350		293	308	98	268	98	18	22
5	63	31	52	4,210		293	319	98	184	89	18	20
6	60	31	50	4,210	2,500	333	333	128	144	76	18	18
7	55	30	49	4,420		935	280	150	683	67	17	16
8	52	30	48	4,070		1,380	232	139	1,800	63	17	15
9	48	30	45	2,380		1,340	208	113	1,940	60	18	15
10	45	26	44	1,010		917	196	94	1,080	53	18	13
11	43	26	56	1,160	484	516	208	84	361	48	14	18
12	41	36	319	3,760	648	361	196	76	208	47	18	49
13	43	76	1,180	4,980	1,260	308	184	139	150	47	19	35
14	43	773	1,560	5,730	1,940	280	220	108	113	47	41	30
15	43	452	1,010	6,530	1,940	268	156	162	94	47	59	24
16	42	220	484		1,420	280	150	108	256	103	953	20
17	43	139	863		1,180	347	139	390	220	76	1,820	16
18	46	144	3,110	4,350	2,100	293	134	484	500	57	1,060	13
19	92	150	3,760		2,740	280	128	361	361	76	361	12
20	138	809	4,490		2,820	268	118	184	280	52	123	11
21	184	1,080	3,760	2,040	2,070	244	118	128	1,140	41	94	10
22	98	597	2,290	2,820	1,420	220	118	108	1,360	184	67	9.0
23	71	308	917	3,640	1,240	220	128	94	2,120	144	76	9.0
24	57	196	452	3,640	1,160	208	139	80	2,290	103	84	8.2
25	56	139	665	3,460	1,380	196	139	84	2,410	103	42	8.6
26	44	108	1,640	2,740	1,420	208	128	80	2,350	49	71	7.8
27	39	98	1,440	1,940	1,020	564	118	71	1,280	45	84	7.4
28	38	80	1,080	2,470	614	1,360	113	71	390	36	58	31
29	37	71	1,400	3,580	452	1,620	113	71	256	31	40	31
30	36	139	2,070	4,420	.....	1,240	113	128	208	28	33	8.6
31	36	.....	2,660	8,100	.....	683	.....	755	.....	24	28	.....

NOTE.—No gage-height record for Oct. 19 and 20, Nov. 18, and Sept. 16; discharge interpolated. Discharge Jan. 16 to 20 and Feb. 3 to 10 estimated, because of ice, from gage heights and weather records. Braced figures show mean daily discharge for the period indicated.

Monthly discharge of Little Wabash River at Wilcox, Ill., for the year ending Sept. 30, 1916.

[Drainage area, 1,130 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	184	36	61.5	0.054	0.06
November	1,080	26	198	.175	.20
December	4,490	44	1,150	1.02	1.18
January	8,100	1,010	3,810	3.37	3.88
February	8,640	.....	2,160	1.91	2.06
March	1,620	196	530	.469	.54
April	452	113	195	.173	.19
May	755	62	155	.137	.16
June	2,410	94	776	.687	.77
July	184	24	75.2	.067	.08
August	1,820	14	172	.152	.18
September	49	7.4	18.4	.016	.02
The year	8,640	7.4	773	.684	9.32

SKILLET FORK AT WAYNE CITY, ILL.

LOCATION.—In sec. 18, T. 2 S., R. 6 E., at Southern Railway bridge 1 mile east of Wayne City, Wayne County, and about 4 miles below mouth of Horse Creek.

DRAINAGE AREA.—481 square miles.

RECORDS AVAILABLE.—August 16, 1908, to December 31, 1912; June 22, 1914, to September 30, 1916.

GAGE.—Chain gage attached to bridge; read by J. C. Taylor.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge; in high water also from downstream side of wooden trestle about one mile east of main channel. Low-water measurements made by wading below gage.

CHANNEL AND CONTROL.—Channel practically permanent; rough. Control is remains of rock dam at bridge section. A determination by leveling on August 20, 1914, indicated that there would be no flow past the gage if the stage fell to 1.6 feet ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during 1914 to 1916, 23.1 feet at noon, August 22, 1915 (discharge, 15,800 second-feet); minimum stage, 1.9 feet July 4, 7, 9, 12, 14, 17, 19, 22, 24, 27, 29, and August 2, 4, 7, 9, 1914 (discharge 0.5 second-foot).

Maximum stage recorded during periods of records, 23.1 feet August 22, 1915 (discharge 15,800 second-feet); zero flow existed for 54 days in September to December, inclusive, of 1908.

DIVERSIONS.—About 30,000 gallons of water a day is pumped from river above gage into service tank of Southern Railway.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice during periods in winter. Rating curve fairly well defined between 15 and 5,000 second-feet, and poorly defined beyond these limits. Gage read to hundredths once daily. Daily discharge determined by applying daily gage heights to rating table. Results good for periods of medium stages, poor for periods of very high stages and for periods affected by ice. Determinations of above 6,000 second-feet subject to considerable error because of poor definition and flatness of rating curve.

Discharge measurements of Skillet Fork at Wayne City, Ill., during the year ending Sept. 30, 1916.

[Made by H. C. Beckman.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 12	3.09	63.4
Sept. 20	2.23	3.7
Sept. 20	2.23	3.8

Daily discharge, in second feet of Skillet Fork at Wayne City, Ill., for the years ending Sept. 30, 1914–1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1914.					16		.8	9.5	9.5
1		3.0	0.8	48	17		.5	5.5	5.5
2		1.5	.5	30	18		.8	5.5	162
3		.8	.8	15	19		.5	1.5	125
4		.5	.5	9.5	20		.8	2.7	44
5		.8	.8	7.5	21		.8	2.2	22
6		.8	.8	4.2	22	44	.5	2.2	22
7		.5	.5	22	23	52	.8	2.2	9.5
8		.8	.8	628	24	37	.5	2.2	9.5
9		.5	.5	1,700	25	22	.8	2.2	9.5
10		.8	.8	1,210	26	15	.8	2.2	9.5
11		.8	73	532	27	9.5	.5	1.5	5.5
12		.5	73	144	28	5.5	.8	5.5	3.0
13		.8	52	48	29	1.5	.5	9.5	1.5
14		.5	44	26	30	3.0	.8	144	2.7
15		.8	22	12	31		.8	132	

Daily discharge, in second-feet, of Skillet Fork at Wayne City, Ill., for the years ending Sept. 30, 1914–1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	1.5	8.7	5.0		7,400	140	18	12	2,900	843	215	34
2	1.4	5.5	5.0		8,200	30	16	12	1,240	1,540	222	30
3	1.4	5.5	4.2	115	7,000	73	16	125	591	417	551	22
4	1.2	5.5	5.5		5,000	52	16	185	185	140	451	22
5	1.2	5.5	9.5		3,950	170	12	52	1,420	200	185	22
6	.8	5.5	9.5	37	3,600	651	12	38	2,600	260	95	15
7	.8	5.5	15	605	2,700	635	12	283	2,060	237	52	22
8	.8	18	18	900	881	385	12	843	960	770	28	18
9	200	22	30	577	237	245	12	155	207	1,620	21	21
10	1,970	22	18	318	132	177	12	102	82	735	18	15
11	2,980	88		192	125	132	12	52	52	300	26	15
12	2,330	88		155	117	95	12	52	42	525	15	15
13	635	37		125	117	66	12	37	34	881	26	15
14	230	22		125	162	66	12	37	34	417	365	15
15	59	18		125	207	52	12	16	26	237	2,700	15
16	59	16		125	185	52	12	12	30	125	2,480	15
17	73	12		605	132	52	11	12	25	73	1,870	15
18	80	5.5		770	84	37	6.7	12	25	44	2,240	15
19	52	5.5		551	59	37	6.7	11	16	260	1,470	15
20	30	4.2		245	44	34	6.7	30	18	605	2,510	15
21	22	4.2	32	155	36	22	6.7	487	2,030	525	7,800	9.5
22	15	4.2		125	46	22	6.7	806	3,290	200	15,800	76
23	15	4.2		125	1,940	22	6.3	475	3,410	66	11,400	40
24	9.5	4.2			3,190	22	6.3	439	3,290	37	7,800	59
25	9.5	4.2			2,900	15	6.3	230	2,060	22	6 200	37
26	9.5	4.2			2,330	15	37	1,370	345	22	3,470	30
27	9.5	4.2		150	605	16	31	2,900	117	327	1,470	18
28	9.5	4.2			200	24	24	3,810	215	300	283	22
29	8.7	5.5			.....	22	22	3,810	1,470	215	95	106
30	8.7	5.0			.....	21	22	3,740	2,510	95	62	30
31	8.7	.....			.....	18	.....	3,530	.....	336	44	.....
1915–16.												
1	18	9.5	12	2,780	9,000	73	114	15	275	8.7	3.2	18
2	15	9.5	7.5	3,600	5,800	66	88	22	140	8.7	95	55
3	12	9.5	9.5	3,670	4,200	66	95	22	170	8.7	215	47
4	9.5	8.7	11	3,140	2,660	52	110	22	185	648	162	29
5	9.5	7.5	9.5	2,000	824	88	88	22	76	275	31	14
6	9.5	7.5	9.5	499	475	375	62	22	200	72	13	7.1
7	9.5	7.5	9.5	275	237	1,770	48	30	2,450	50	9.1	7.1
8	7.5	7.5	9.5	185	200	1,720	40	30	2,780	21	5.0	192
9	5.5	7.5	9.5	132		770	37	26	1,640	14	4.5	86
10	7.5	7.5	9.5	132		275	30	26	406	8.7	3.2	21
11	5.5	7.5	34			185	30	17	125	8.7	19	12
12	5.5	22	345			132	26	15	52	8.7	60	7.1
13	5.5	30	327		345	80	22	15	40	770	770	7.1
14	5.5	37	275			80	22	12	37	327	1,080	5.2
15	5.5	52	275	2,170		88	22	230	30	65	1,300	4.0
16	5.5	52	132			106	22	770	52	50	2,630	4.0
17	5.5	31	960			102	22	245	185	28	2,700	2.1
18	5.5	30	1,620		770	102	22	106	125	20	1,670	2.1
19	5.5	52	1,640		1,040	98	18	52	1,240	20	525	2.1
20	5.5	88	960		900	80	18	33	1,620	245	114	2.6
21	5.5	88	275	327	439	80	22	34	300	121	40	3.5
22	5.5	88	155	1,570	309	88	52	34	200	121	215	3.0
23	5.5	73	125	1,800	300	125	52	40	52	28	475	2.2
24	5.5	52	125	1,020	345	88	38	52	52	20	121	1.5
25	5.5	31	125	620	345	62	34	37	52	11	34	1.5
26	5.5	30	667	605	267	375	30	26	37	11	26	.8
27	5.5	28	635	651	200	428	26	15	30	11	327	.8
28	7.5	22	605	2,210	170	428	22	132	22	4.8	385	5.5
29	9.5	15	684	3,530	84	318	22	275	15	3.5	70	4.2
30	9.5	9.5	1,940	7,400	.....	300	17	1,470	15	3.5	28	4.2
31	9.5	.....	2,390	15,400	.....	155	.....	651	.....	3.5	18	.....

NOTE.—Discharge Dec. 11, 1914, to Jan. 5, 1915, Jan. 24–31, 1915, and Jan. 11–20 and Feb. 9–17, 1916, estimated because of ice, from gage heights, observer's notes, and weather records. Braced figures show mean daily discharge for the period indicated.

Monthly discharge of Skillet Fork at Wayne City, Ill., for the years ending Sept. 30, 1914–1916.

[Drainage area, 481 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1914.					
June 22–30	52	1.5	21.1	0.044	0.01
July	3	.5	.79	.0016	.002
August	144	.5	19.4	.040	.05
September	1,700	1.5	162	.337	.38
1914-15.					
October	2,980	.8	285	.593	.68
November	88	4.2	14.3	.031	.03
December	.....	.....	25.5	.053	.06
January	.....	.....	246	.511	.59
February	8,200	36	1,840	3.83	4.13
March	651	15	110	.228	.26
April	37	6.3	13.6	.028	.03
May	3,810	11	764	1.59	1.83
June	3,410	16	1,040	2.16	2.41
July	1,620	22	399	.829	.96
August	15,800	15	2,260	4.70	5.42
September	106	9.5	26.6	.055	.06
The year	15,800	.8	579	1.20	16.46
1915–16.					
October	18	5.5	7.52	.016	.02
November	88	7.5	30.7	.064	.07
December	2,390	7.5	464	.965	1.11
January	15,400	.....	2,360	4.91	5.66
February	9,000	84	1,090	2.27	2.45
March	1,770	52	282	.586	.68
April	114	17	41.7	.087	.10
May	1,470	12	145	.301	.35
June	2,780	15	420	.873	.97
July	770	3.5	97.8	.203	.23
August	2,700	3.2	424	.881	1.02
September	192	.8	18.4	.038	.04
The year	15,400	.8	449	.933	12.70

CUMBERLAND RIVER BASIN.

CUMBERLAND RIVER AT CUMBERLAND FALLS, KY.

LOCATION.—At Cumberland Falls post office, Whitley County, about 400 feet above the falls, 13 miles from Parkers Lake post office and Cumberland Falls railroad station, McCreary County, on the Queen & Crescent Route.

DRAINAGE AREA.—2,040 square miles (measured on maps of Kentucky and Tennessee prepared by the United States Geological Survey on scale 1:500,000).

RECORDS AVAILABLE.—August 15, 1907, to December 10, 1911; April 1, 1915, to September 30, 1916.

GAGE.—Staff, inclined and vertical, on right bank, 400 feet above brink of falls, established April 3, 1915, and read by Alice Brunson. An inclined and vertical staff gage was established in August, 1907, by Viele, Blackwell & Buck, on right bank about 300 feet above site of Survey gage; this gage was read twice daily until March 18, 1911, and once daily from March 19 to December 10, 1911, by H. C. Brunson; nothing is left of it except the bench mark to which it was referred. A staff gage reading to about 6 feet was installed in 1914 on a large boulder in the river near the left bank, practically opposite the site of the gage established in August, 1907; no readings of this gage are available.

DISCHARGE MEASUREMENTS.—Made from cable about 600 feet above gage. A reference gage on left bank near cable is used to determine depths when soundings can not be made.

CHANNEL AND CONTROL.—Solid rock; permanent. At high stages the edge of the falls serves as control, there being a vertical drop of about 68 feet at the falls at low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.45 feet at 4.30 p. m. December 18 (discharge, 45,200 second-feet); minimum, 1.33 feet at 6 p. m. September 28 (discharge, 146 second-feet).

Highest known stage corresponds to about 12 feet on Survey gage; lowest stage, according to Wm. Taylor, a local resident, in September, 1916, occurred in 1902, when entire flow of river was confined in a channel 7 feet wide, 1 foot deep, flowing fast; under these conditions, the discharge would probably be about 30 second-feet.

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Low-water flow may be affected to a small extent by operation of power plant at Williamsburg, about 25 miles above the station.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Results excellent.

COOPERATION.—Station maintained in cooperation with the Kentucky Geological Survey, J. B. Hoeing, State geologist.

Discharge measurements of Cumberland River at Cumberland Falls, Ky., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 23	A. H. Horton	2.33	1,500
Sept. 13	B. E. Jones	1.50	280
14	....do	1.47	244

Daily discharge, in second-feet, of Cumberland River at Cumberland Falls, Ky., for the years ending Sept. 30, 1915 and 1916.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16							1915–16						
1.....	2,800	686	3,570	742	380	2,440	16....	1,270	658	9,460	5,410	1,360	440
2.....	2,220	728	3,570	890	380	1,780	17....	1,200	591	7,680	3,180	1,200	392
3.....	1,890	1,060	7,680	800	1,270	1,670	18....	1,110	552	4,150	2,560	4,760	359
4.....	1,670	2,560	6,470	1,460	1,670	1,560	19....	1,040	526	2,560	2,110	5,410	338
5.....	1,560	2,800	3,300	2,920	1,130	1,560	20....	971	500	1,890	1,780	4,450	317
6.....	1,360	2,440	2,000	3,570	742	1,780	21....	905	476	1,890	2,110	4,450	526
7.....	1,270	2,110	1,560	4,150	500	1,890	22....	860	452	3,850	2,800	4,150	830
8.....	1,230	1,670	2,220	3,050	392	1,670	23....	830	488	4,150	1,890	2,560	742
9.....	1,200	1,460	3,180	2,920	359	1,460	24....	770	2,110	2,560	1,270	1,560	658
10.....	1,160	1,360	2,560	3,300	338	1,180	25....	742	1,670	2,000	1,020	1,250	539
11.....	1,130	1,220	1,890	3,850	2,000	954	26....	714	1,670	1,230	785	890	440
12.....	1,270	1,070	1,460	4,150	2,110	800	27....	686	4,150	920	630	1,670	380
13.....	1,460	937	1,140	9,000	2,680	658	28....	658	8,550	770	565	9,930	338
14.....	1,460	830	1,130	21,700	2,800	552	29....	644	14,000	658	500	7,680	1,180
15.....	1,460	742	1,270	12,400	2,220	476	30....	686	8,110	591	440	6,470	1,890
							31....	.....	4,760	.....	404	3,850	.....

Daily discharge, in second-feet, of Cumberland River at Cumberland Falls, Ky., for the years ending Sept. 30, 1915 and 1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr	May.	June.	July.	Aug.	Sept.
1915-16.												
1	12,900	500	3,050	20,400	3,570	3,050	4,760	2,330	3,440	464	700	359
2	18,000	476	2,560	12,900	6,860	4,450	3,850	2,000	2,440	416	526	338
3	15,600	452	2,330	11,900	8,110	6,860	3,300	1,780	1,670	380	630	348
4	6,100	428	2,110	9,930	6,470	7,680	2,800	1,780	1,160	359	2,680	338
5	3,850	404	1,890	6,470	5,410	6,470	2,560	1,460	875	359	2,800	328
6	5,080	380	1,670	5,410	5,080	5,080	2,220	1,360	800	359	1,560	317
7	4,150	359	1,460	15,000	5,080	5,410	2,000	1,200	1,220	338	1,460	306
8	3,180	338	1,270	28,800	5,750	8,550	3,440	1,060	2,680	338	9,460	296
9	2,330	359	1,230	23,000	6,100	9,930	6,860	954	2,680	452	5,410	306
10	1,780	416	1,160	12,900	8,550	6,860	7,680	830	2,110	1,270	3,440	317
11	1,460	392	1,110	6,470	9,460	4,760	5,750	756	1,460	1,270	2,560	306
12	1,160	440	1,460	5,410	6,860	3,850	4,760	686	2,110	1,130	2,220	296
13	1,000	1,780	2,330	16,800	5,410	3,050	4,150	604	3,850	920	2,330	275
14	875	2,920	2,800	18,600	4,150	2,680	3,850	552	3,050	770	3,850	251
15	770	30,200	2,800	14,000	3,300	2,440	3,180	500	2,560	658	3,440	306
16	714	27,500	6,860	7,680	2,800	2,330	2,680	452	2,220	578	2,680	296
17	658	15,600	15,600	5,750	2,560	2,220	2,330	404	2,330	526	2,800	988
18	604	8,110	43,500	4,450	2,330	2,000	2,110	380	2,680	1,060	3,850	526
19	3,180	6,860	40,700	3,570	2,220	1,890	1,890	359	2,800	1,890	3,850	359
20	4,150	8,550	33,700	3,180	1,890	1,780	1,560	338	1,890	2,560	1,890	296
21	2,560	8,110	26,800	3,050	1,670	1,780	1,460	328	1,560	2,800	1,360	243
22	1,670	5,750	13,400	4,760	1,560	1,780	1,460	317	1,360	6,100	1,060	203
23	1,270	4,150	5,080	15,000	1,460	1,890	1,560	359	1,110	5,080	845	185
24	1,020	3,050	3,300	14,000	1,890	1,780	2,000	428	954	3,050	672	181
25	815	2,560	3,050	8,550	2,800	1,670	1,890	604	728	1,890	578	167
26	686	2,110	5,080	5,410	3,440	1,560	1,780	937	686	1,360	526	160
27	630	2,680	9,930	4,450	4,150	2,440	1,890	830	785	954	476	153
28	604	4,760	9,930	3,440	3,850	8,110	2,000	644	800	714	452	146
29	578	4,760	24,900	3,050	3,300	9,930	2,330	591	742	617	428	160
30	552	3,850	29,500	2,920	.....	6,860	2,560	3,050	565	2,220	404	160
31	526	.....	25,600	2,680	.....	5,750	.....	4,150	.....	1,090	380	.....

Monthly discharge of Cumberland River at Cumberland Falls, Ky., for the year ending Sept. 30, 1915 and 1916.

[Drainage area 2,040 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1915.					
April	2,800	644	1,210	0.593	0.66
May	14,000	452	2,290	1.12	1.29
June	9,460	591	2,910	1.43	1.60
July	21,700	404	3,300	1.62	1.87
August	9,930	338	2,600	1.27	1.46
September	2,440	317	993	.487	.54
1915-16.					
October	18,000	526	3,180	1.56	1.80
November	30,200	338	4,940	2.42	2.70
December	43,500	1,110	10,500	5.15	5.94
January	28,800	2,680	9,680	4.75	5.48
February	9,460	1,460	4,350	2.13	2.30
March	9,930	1,560	4,350	2.13	2.46
April	7,680	1,460	3,020	1.48	1.65
May	4,150	317	1,030	.505	.58
June	8,850	565	1,780	.873	.97
July	6,100	338	1,350	.662	.76
August	9,460	380	2,110	1.03	1.19
September	988	146	297	.146	.16
The year	43,500	146	3,900	1.91	25.99

CUMBERLAND RIVER AT BURNSIDE, KY.

LOCATION.—Below the mouth of South Fork of Cumberland River at Burnside, Pulaski County.

DRAINAGE AREA.—4,890 square miles (measured on maps of Kentucky and Tennessee, prepared by United States Geological Survey on scale 1:500,000).

RECORDS AVAILABLE.—February 19, 1915, to September 30, 1916.

GAGE.—Vertical staff in two sections on piers of toll bridge across South Fork of Cumberland River about 700 feet above mouth; installed in July, 1914, by United States Weather Bureau; readings on this gage by the Weather Bureau began January 1, 1915; sea-level elevation of zero, 589.53 feet (Smith Shoals Survey datum, U. S. Engineer Corps); datum same as that of gage which was marked on the rails of inclines 1 and 2 leading from the South Fork to the warehouse, about 500 feet below the present gage, and which was established in 1884 and read daily until January 1, 1915; upper part of old gage, reading from 54 to 71 feet, was spiked to office of Col. Cole. The United States Weather Bureau [1] reports that "the old river gage was changed on several unknown dates and by amounts that are uncertain, so that readings prior to January 1, 1915, are not comparable by from 0.1 to 0.7 foot." New gage is read for the United States Geological Survey, by C. M. Estes.

DISCHARGE MEASUREMENTS.—Flow of South Fork is measured from the highway bridge; the Cumberland above the South Fork is measured from a boat, from the Queen & Crescent Railroad bridge, or by means of floats, the method used depending on the stage; flow below the South Fork is the combined flow of both streams.

CHANNEL AND CONTROL.—Channel considered permanent except for deposits of mud, which are washed away at high stages. Low-water control is crest of Dam No. 21, 28 miles below Burnside; gage height of crest of dam, 1.47 feet. The dam is a recently built concrete structure, and little or no water leaks through dam or lock.

EXTREMES OF STAGE.—Maximum stage recorded during year, 53.8 feet at 8 a. m., December 19; minimum stage 2.16 feet at 6.45 a. m., September 28.

Maximum stage recorded, 62 feet March 31, 1886; minimum, —1.6 feet November 8 and 9, 1895; lowest stage possible at present, unless pool No. 21 is lowered, 1.47 feet.

ICE.—Stage-discharge relation seldom if ever affected by ice.

REGULATION.—Stage at low water will be affected by any manipulation of the level of pool No. 21 at the lock.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Rating curve not developed. Gage read to hundredths twice daily. Records excellent except for effect of possible regulation of pool above dam No. 21 by opening valves or culverts in the lock. At low stages discharge relation may be affected by water entering between the gage and the dam due to heavy local showers in the basins of the small intervening tributaries.

COOPERATION.—Station maintained in cooperation with the Kentucky Geological Survey, J. B. Hoeing, State geologist.

The following discharge measurements were made during the year:

April 26, 1916, by A. H. Horton: Gage height, 5.06 feet; discharge, 3,390 second-feet.

September 11, 1916, by B. E. Jones: Gage height, 2.41 feet; discharge, 571 second-feet.

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[1] Daily river stages, pt. 12, p. 29.

Daily gage height, in feet, of Cumberland River at Burnside, Ky., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	17.00	3.33	7.50	22.58	10.70	7.20	10.03	5.40	10.70	2.85	3.57	2.53
2	22.30	3.25	6.82	23.00	14.85	8.60	8.91	5.12	7.77	2.72	3.11	2.69
3	16.94	3.15	6.42	23.30	15.09	12.65	8.00	4.92	6.00	2.56	4.06	2.69
4	12.68	3.04	6.00	18.38	13.04	13.40	7.36	5.91	5.10	2.46	4.51	2.62
5	11.52	3.03	5.80	14.47	11.31	12.24	6.93	7.74	4.37	2.45	5.98	2.73
6	14.28	2.92	5.34	12.56	10.55	10.85	6.28	6.67	4.11	2.37	5.09	2.74
7	11.34	2.85	5.04	18.30	10.55	11.05	5.82	5.91	4.76	2.35	5.15	2.63
8	8.78	2.84	4.74	35.30	10.32	14.64	8.15	5.16	6.73	2.33	8.17	2.55
9	7.06	2.87	4.54	27.20	10.32	14.94	13.30	4.77	6.72	2.40	9.48	2.45
10	6.00	3.57	4.38	19.85	13.35	12.98	13.65	4.37	5.80	3.15	8.50	2.43
11	5.02	3.85	4.28	15.81	14.70	10.80	12.18	4.06	5.10	5.55	5.96	2.45
12	4.59	3.72	5.20	21.42	13.55	9.43	10.52	3.81	5.07	5.10	5.45	2.36
13	4.22	5.02	6.70	26.07	11.90	8.02	9.45	3.59	8.41	5.44	8.41	2.45
14	3.92	9.20	7.35	30.56	10.40	7.35	8.48	3.45	8.22	4.83	7.16	2.59
15	3.68	40.40	7.38	21.30	8.85	6.90	7.71	3.32	6.92	4.06	7.03	2.61
16	3.56	41.80	14.80	15.65	7.89	6.89	7.13	3.35	6.24	3.75	10.42	2.47
17	3.54	26.75	32.80	12.85	7.38	6.67	7.06	3.35	6.12	3.67	11.93	2.43
18	3.54	16.70	48.18	10.82	7.00	6.29	6.06	3.22	6.54	4.24	9.57	3.15
19	4.64	18.71	46.40	9.10	6.70	6.10	5.69	3.03	6.08	4.79	7.94	2.89
20	16.68	22.51	36.28	8.30	6.25	5.84	5.26	2.91	5.45	6.77	6.50	2.65
21	12.23	17.34	26.81	8.20	5.84	5.69	5.05	2.84	4.92	8.86	5.18	2.43
22	8.38	13.60	19.14	10.60	5.45	5.75	5.05	2.85	4.41	10.76	4.43	2.23
23	6.58	10.70	12.05	20.95	5.27	5.62	5.13	2.89	4.06	10.83	3.95	2.43
24	5.70	8.92	9.04	20.55	5.55	5.38	5.12	3.07	3.71	7.86	3.69	2.32
25	4.92	7.69	8.68	16.04	6.97	5.15	5.20	3.51	3.45	5.92	3.43	2.29
26	4.46	6.80	11.00	12.55	7.88	5.20	5.06	3.54	3.33	5.03	3.43	2.25
27	4.08	6.41	14.64	10.62	8.21	7.00	5.10	3.47	3.18	4.61	3.17	2.17
28	3.86	7.10	15.35	9.10	8.19	12.55	5.33	3.35	3.11	4.36	2.99	2.16
29	3.74	9.25	27.80	8.62	7.60	15.81	5.40	3.07	3.05	3.65	2.87	2.81
30	3.65	8.38	38.59	8.92	.....	13.74	5.44	5.67	3.00	3.32	2.81	2.53
31	3.49	.....	28.55	8.60	.....	11.50	.....	16.06	.....	4.05	2.53	.....

SOUTH FORK OF CUMBERLAND RIVER AT NEVELSVILLE, KY.

LOCATION.—One-fourth mile below Turkey Creek ferry on Greenwood-Monticello pike, about a mile from Nevelsville, McCreary County. Little South Fork enters on left, about 1¾ miles above station.

DRAINAGE AREA.—1,260 square miles (measured on maps of Kentucky and Tennessee prepared by United States Geological Survey on scale 1:500,000).

RECORDS AVAILABLE.—March 10, 1915, to September 30, 1916.

GAGE.—Vertical staff gage in five sections bolted to rock ledges on left bank; read by Mart Keith; a reference gage for use in referencing soundings at the measuring section is attached to a tree on the left bank 110 feet below cable.

DISCHARGE MEASUREMENTS.—Made from cable about 2,000 feet below gage or by wading at low stages.

CHANNEL AND CONTROL.—Channel straight above and below; bed, compact gravel. Low-water control is partly the bed of the river below gage and partly a gravel bar about 2 miles below gage. Both are probably permanent. High-water control is bed of stream for several miles below gage, and may be slightly affected by foliage along the banks.

EXTREMES OF STAGE.—Maximum stage recorded during year, 36.72 feet at 5.30 p. m. November 15; minimum stage, 2.01 feet at 6.30 a. m. September 28

ICE.—Stage-discharge relation seldom if ever affected by ice.

REGULATION. Operation of a small power plant short distance above gage may affect flow at extreme low water.

ACCURACY.—Stage-discharge relation probably permanent; not affected by ice during year. Rating curve not developed. Gage read to hundredths twice daily.

COOPERATION.—Station maintained in cooperation with State Geological Survey of Kentucky, J. B. Hoeing, State geologist.

Discharge measurements of South Fork of Cumberland River at Nevelsville, Ky., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 24	A. H. Horton	4.48	1,290
Sept. 16	B. E. Jones	2.20	150
17	....do	3.07	446

Daily gage height, in feet, of South Fork of Cumberland River at Nevelsville, Ky., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16.70	3.46	5.28	10.58	7.04	5.07	6.43	3.72	8.28	2.46	2.79	2.60
2	15.24	3.36	5.00	16.48	10.10	6.78	5.83	3.61.	5.91	2.37	4.30	2.58
3	8.35	3.26	4.80	15.44	8.78	8.92	5.49	3.57	4.76	2.47	5.12	2.72
4	6.34	3.15	4.58	10.93	7.46	8.15	5.30	4.27	4.31	2.35	4.23	2.93
5	7.70	3.07	4.42	8.89	6.89	7.23	5.01	4.33	4.13	2.26	4.08	2.93
6	10.45	3.02	4.24	8.48	6.66	6.65	4.67	4.13	3.81	2.31	4.63	2.29
7	7.74	2.97	4.05	18.80	6.58	7.49	4.55	3.87	4.79	2.17	4.32	2.60
8	6.20	2.96	3.92	22.96	6.14	9.54	6.69	3.69	7.17	2.13	3.88	2.53
9	5.18	3.60	3.82	12.64	6.10	8.52	9.41	3.53	5.30	2.78	5.12	2.46
10	4.56	5.16	3.74	9.84	7.77	7.35	8.37	3.41	4.41	5.47	4.70	2.35
11	4.19	4.28	3.74	8.77	8.04	6.67	7.44	3.27	3.91	6.39	3.96	2.30
12	3.92	4.31	4.44	8.24	7.33	6.01	6.77	3.15	5.74	5.28	7.04	2.35
13	3.71	7.52	4.62	17.02	6.74	5.52	6.11	3.06	10.06	5.52	9.13	2.31
14	3.56	10.96	4.62	16.18	6.20	5.27	5.68	2.99	7.39	4.43	6.62	2.25
15	3.42	36.62	4.51	10.04	5.52	5.13	5.29	3.06	5.81	3.96	6.20	2.24
16	3.33	20.62	8.56	8.76	5.19	4.97	4.96	3.42	5.04	3.74	7.27	2.33
17	3.29	11.48	13.62	8.12	5.02	4.73	4.68	3.11	4.55	3.64	8.83	3.04
18	3.26	8.54	30.30	6.96	4.89	4.57	4.56	2.95	4.40	4.62	7.34	2.77
19	9.32	16.68	20.65	6.22	4.69	4.51	4.39	2.86	3.93	5.00	6.30	2.55
20	17.96	15.55	11.42	6.08	4.44	4.40	4.15	2.80	3.67	6.72	5.03	2.35
21	10.06	10.89	8.83	6.06	4.26	4.31	4.17	2.74	3.49	9.71	4.34	2.25
22	7.35	8.60	7.43	8.10	4.13	4.39	4.57	2.72	3.39	10.68	3.90	2.18
23	6.00	7.25	6.60	16.02	4.06	4.31	4.71	2.84	3.28	7.47	3.56	2.23
24	5.24	6.40	6.00	11.44	4.52	4.13	4.55	3.10	3.08	5.55	3.33	2.24
25	4.73	5.75	6.26	8.92	6.08	4.03	4.33	4.29	3.07	4.51	3.11	2.15
26	4.43	5.20	10.82	7.63	6.08	4.73	4.23	3.59	3.25	4.48	3.05	2.09
27	4.10	5.20	9.98	6.81	5.84	6.49	4.25	3.19	2.96	4.07	2.88	2.04
28	3.94	7.16	9.38	6.21	5.38	11.35	4.19	2.93	2.80	3.85	2.76	2.04
29	3.92	6.28	21.82	5.96	5.20	10.92	3.99	2.85	2.70	3.42	2.86	2.04
30	3.77	5.80	21.82	5.81	.....	8.68	3.84	7.67	2.56	3.12	2.86	2.21
31	3.60	.....	11.83	5.48	.....	7.28	.....	15.22	.....	2.92	2.74	.....

CANEY FORK NEAR ROCK ISLAND, TENN.

LOCATION.—One mile north of Rock Island, Warren County, 800 feet downstream from mouth of Collins River and 1 mile upstream from power house of Tennessee Power Co.

DRAINAGE AREA.—1,640 square miles (measured on Post Route map).

RECORDS AVAILABLE.—November 14, 1911, to September 30, 1916.

GAGE.—Bristol water-stage recorder on left bank, 300 feet downstream from Rock Island dam; installed March 26, 1916, at site of staff gage known as gage "B;" checked daily by observer's reading of staff gage nearby. Prior to March 26, 1916, daily mean stage was determined from a water-stage recorder, known by the Billesby Co. as gage "A," 400 feet upstream, just above point at which dam is now being built; date of installation of recorder not known. Backwater from dam began to affect stage-discharge relation at gage "A" March 26, 1916.

DISCHARGE MEASUREMENTS.—Made from cable at present gage or from temporary sluiceways in dam 300 feet above gage.

CHANNEL AND CONTROL.—Bed of stream above and below gage consists chiefly of solid rock; permanent. Control formed by riffles and falls below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.30 feet December 18 (discharge, 43,300 second-feet); minimum stage, 0.50 foot September 25 and 30 (discharge, 430 second-feet).

1911–1916: Maximum stage recorded, 13.2 feet April 2, 1912 (discharge, 107,000 second-feet); minimum stage, 0.20 foot September 17, 20, 21, and October 4, 5, 10, 1914 (discharge, 220 second-feet).

DIVERSIONS.—None.

REGULATION.—Some slight diurnal fluctuation caused by operation of small mills upstream.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 300 and 25,000 second-feet, above which it is an extension; above 4,700 second-feet and below 430 second-feet curve is based on rating curve constructed by the H. M. Billesby Engineering Co., Chicago, Ill. Mean daily gage heights computed by Tennessee Power Co. Daily discharge ascertained by applying mean gage heights to rating table. Records excellent except for extremely high stages.

COOPERATION.—Records prior to January 1, 1915, collected by the H. M. Billesby Engineering Co.; records from January 1, 1915, to March 26, 1916, collected and computed by the Tennessee Power Co., which used the Billesby rating curve.

Discharge measurements of Caney Fork near Rock Island, Tenn., during the year ending Sept. 30, 1916

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	L. J. Hall	1.83	2,100	Mar. 31	L. J. Hall	2.74	4,530
24	W. E. Hall and L. J. Hall.	1.88	2,230	May 18	.....do	.98	863
Mar. 17	.....do	2.00	2,370	Sept. 25	.....do	.49	432
25	L. J. Hall	1.51	1,560	25	.....do	.54	468

Daily discharge, in second-feet, of Caney Fork near Rock Island, Tenn., for the years ending Sept. 30, 1912–1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	.....	.....	1,680	17,660	7,900	6,654	14,170	16,900	1,480	1,770	728	520
2	.....	.....	1,510	11,140	6,010	5,200	107,000	9,300	2,080	1,480	680	536
3	.....	.....	1,360	7,720	4,720	4,480	45,000	7,240	1,850	1,990	757	536
4	.....	.....	1,290	5,800	4,080	4,615	16,170	6,385	1,995	1,990	662	485
5	.....	.....	1,140	4,800	3,400	4,255	10,950	5,195	2,080	2,492	565	457
6	.....	.....	1,080	3,850	3,020	6,185	8,250	7,905	1,905	3,265	521	428
7	.....	.....	995	3,330	2,680	6,680	7,040	11,870	1,602	3,265	635	420
8	.....	.....	940	3,250	2,580	6,780	7,420	8,650	1,408	3,450	680	420
9	.....	.....	890	10,200	2,380	11,900	6,120	6,850	1,215	2,915	680	400
10	.....	.....	850	6,340	2,265	10,560	5,165	5,190	1,120	3,450	775	360
11	.....	.....	910	5,600	2,155	8,100	4,590	6,010	1,055	3,250	757	330
12	.....	.....	1,340	4,780	2,040	6,830	3,920	6,520	950	3,610	757	320
13	.....	.....	3,630	4,080	2,000	9,800	3,665	6,075	900	4,200	710	298
14	.....	2,870	6,840	3,340	1,980	9,970	3,480	4,240	900	3,265	614	298
15	.....	2,250	15,260	3,070	1,980	44,100	3,360	3,810	845	3,140	710	270
16	.....	1,710	19,800	2,670	2,040	25,800	4,200	3,580	800	2,815	521	298
17	.....	1,410	14,050	2,320	2,020	13,530	5,485	3,715	815	2,775	635	260
18	.....	2,110	8,030	2,300	1,980	9,600	6,240	3,185	845	2,165	662	336
19	.....	3,200	5,400	3,700	1,980	7,375	5,325	2,770	900	2,670	728	420
20	.....	3,015	4,360	5,530	2,110	6,000	4,480	2,460	800	4,700	757	493
21	.....	2,260	4,190	4,400	16,800	4,860	4,100	2,265	760	3,740	710	662
22	.....	1,780	5,180	3,830	21,200	4,215	7,380	1,980	760	2,775	728	2,456
23	.....	1,560	13,570	3,340	11,500	3,960	10,600	1,887	710	2,200	662	2,245
24	.....	1,440	9,880	3,170	8,130	28,600	7,560	1,575	730	1,735	662	2,145
25	.....	1,500	8,800	2,870	7,380	22,140	5,500	1,515	760	1,520	635	1,996
26	.....	1,580	9,880	2,670	26,700	12,270	4,560	1,390	800	1,330	775	1,996
27	.....	1,510	35,100	2,500	26,700	8,840	25,780	1,360	920	1,215	845	1,900
28	.....	1,460	20,000	2,360	13,530	7,626	33,300	1,445	950	1,056	680	1,996
29	.....	1,610	10,170	12,880	9,100	68,390	43,150	5,215	950	920	662	2,080
30	.....	1,800	7,700	18,970	.....	24,690	33,700	6,370	1,520	775	662	1,996
31	.....	.....	23,680	11,510	.....	13,820	.....	3,665	.....	755	565	.....
1912–13.												
1	1,900	360	330	5,840	9,250	13,800	6,350	.....	.....	1,255	361	310
2	1,680	360	330	4,210	8,270	8,900	4,360	.....	.....	1,186	522	310
3	1,610	360	340	4,210	7,730	6,345	4,080	.....	.....	1,120	450	310
4	1,520	520	615	5,320	7,373	3,950	6,680	.....	.....	1,000	400	310
5	1,347	570	2,080	5,540	5,850	4,835	4,600	.....	.....	800	361	310
6	1,012	440	7,380	5,540	5,150	5,155	4,600	.....	.....	613	330	310
7	807	400	5,360	15,970	4,360	4,600	4,080	.....	1,990	450	330	310
8	610	360	3,800	55,000	3,810	4,220	3,950	.....	4,700	298	298	310
9	530	360	1,140	18,830	2,980	3,950	3,950	.....	2,260	270	298	325
10	455	360	1,000	14,830	4,700	3,350	3,810	.....	2,165	270	270	310
11	450	270	1,000	8,100	7,080	2,980	3,450	.....	1,834	243	243	310
12	420	270	1,000	23,500	19,500	7,730	3,100	.....	1,660	298	243	310
13	420	320	1,000	17,100	14,500	8,900	2,265	.....	1,330	298	298	310
14	400	360	950	9,460	11,450	78,000	1,900	.....	1,460	298	330	310
15	400	380	660	6,850	9,830	55,500	4,600	.....	845	298	298	310
16	403	360	570	5,680	7,010	20,200	3,360	.....	670	298	270	310
17	400	360	520	7,015	5,320	16,500	5,350	.....	485	298	270	310
18	700	330	570	8,100	4,600	9,960	4,830	.....	485	270	298	310
19	610	330	520	7,910	5,260	10,800	4,830	.....	450	243	330	310
20	520	330	520	7,380	4,890	9,040	4,360	.....	400	270	400	310
21	520	330	520	12,220	4,650	7,015	3,810	.....	400	298	361	310
22	485	330	520	10,840	4,600	5,260	2,880	.....	400	298	361	310
23	485	330	570	32,600	3,805	5,495	2,775	.....	485	330	330	310
24	450	320	660	87,000	3,265	5,150	1,995	.....	610	330	330	310
25	424	300	900	30,600	2,940	11,660	1,735	.....	800	330	298	310
26	403	330	1,540	13,300	3,200	16,300	1,815	.....	800	298	270	310
27	400	330	2,560	16,400	16,400	78,000	1,520	.....	900	270	243	310
28	400	320	2,780	24,200	40,700	30,100	1,330	.....	1,000	270	243	310
29	330	300	2,560	11,440	.....	17,700	1,330	.....	1,120	270	270	310
30	361	300	2,460	11,820	.....	12,300	1,187	.....	1,186	298	298	310
31	361	.....	8,400	12,860	.....	9,740	.....	.....	.....	330	270	.....

Daily discharge, in second-feet, of Caney Fork near Rock Island, Tenn., for the years ending Sept. 30, 1912–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	310	310	280	310	28,600	2,300	10,600	1,050	.....	.....	620	775
2	310	280	250	325	9,650	2,020	8,500	830	.....	.....	525	755
3	310	310	310	350	3,750	1,890	6,610	650	.....	.....	495	705
4	325	280	325	325	3,200	1,810	4,740	650	.....	.....	940	705
5	280	310	310	310	2,280	1,890	3,610	1,510	.....	.....	1,030	660
6	310	310	310	280	2,180	1,830	3,000	3,970	.....	.....	775	610
7	310	325	400	250	7,600	1,920	2,810	2,780	.....	.....	680	570
8	325	325	350	280	5,850	1,740	3,340	2,030	.....	.....	640	525
9	310	310	310	310	3,950	1,740	4,130	1,730	.....	.....	970	485
10	325	310	325	310	3,350	1,900	3,300	1,390	.....	.....	640	450
11	310	310	310	310	3,820	2,490	2,800	1,260	.....	.....	640	450
12	280	280	280	310	3,700	6,880	2,830	1,150	.....	.....	725	410
13	325	280	250	280	3,560	6,420	3,700	900	.....	.....	960	375
14	310	325	280	250	5,550	4,920	6,550	700	.....	.....	800	345
15	280	310	280	280	5,710	3,900	12,600	650	.....	1,630	1,150	320
16	310	310	310	280	4,350	3,830	9,890	600	.....	2,820	1,465	290
17	310	325	310	310	3,450	2,810	7,260	590	.....	7,530	1,130	220
18	280	350	325	310	2,660	2,650	5,200	590	.....	10,980	830	245
19	310	325	325	325	2,350	2,810	.....	620	.....	5,410	630	245
20	280	310	350	326	2,750	2,440	4,810	650	.....	2,970	535	220
21	310	280	325	350	3,450	2,340	5,050	700	.....	2,375	500	220
22	310	250	310	325	2,650	2,400	4,690	750	.....	1,900	700	265
23	325	280	310	310	2,650	2,480	3,450	750	.....	1,465	510	290
24	310	310	250	310	2,900	2,480	2,650	820	.....	1,150	390	450
25	310	325	310	280	3,150	2,400	2,310	820	.....	880	435	450
26	280	350	350	310	2,780	2,310	2,100	820	.....	715	495	450
27	310	400	400	250	2,650	2,240	1,890	820	.....	2,395	900	410
28	325	325	800	310	2,650	2,200	1,610	900	.....	1,630	940	375
29	310	310	600	310	.....	2,310	1,390	880	.....	1,315	1,130	345
30	310	310	450	2,180	.....	12,650	1,200	880	.....	1,160	1,080	320
31	310	.....	310	21,200	.....	16,430	1,100	[a] 800	.....	940	830	.....
1914–15.												
1	265	485	470	8,490	35,800	1,730	3,790	1,000	1,660	3,560	725	1,465
2	265	465	840	7,240	39,500	1,615	4,210	970	2,760	3,960	690	1,315
3	245	485	990	5,250	16,370	1,630	3,960	930	2,660	4,790	755	1,160
4	220	495	3,790	4,240	11,300	1,660	3,500	940	2,090	6,220	780	1,115
5	220	470	10,320	3,690	9,450	2,360	3,080	900	1,585	8,450	715	7,970
6	245	410	7,140	4,120	11,840	4,640	2,680	900	1,410	4,500	630	15,050
7	245	375	5,090	7,820	9,050	4,790	2,510	900	1,330	2,455	595	7,530
8	265	410	4,090	7,050	7,530	4,160	2,280	850	1,250	2,180	595	4,730
9	245	370	3,440	5,640	6,160	3,440	2,090	970	1,240	1,915	585	3,530
10	220	400	3,080	4,730	5,150	3,080	2,000	1,115	1,160	1,435	890	2,660
11	375	465	2,660	9,570	4,330	2,880	2,090	1,060	1,000	1,370	890	2,180
12	485	460	2,270	27,000	3,740	2,560	3,690	950	920	1,300	1,745	1,915
13	375	450	2,180	15,750	3,560	2,270	4,060	950	1,090	10,020	1,510	1,660
14	450	450	2,105	10,820	3,190	2,180	3,360	1,060	1,495	16,230	1,060	1,435
15	2,360	440	1,915	9,050	3,240	2,090	2,860	1,150	3,690	8,190	1,115	1,370
16	10,820	390	1,745	7,400	3,260	2,090	2,455	1,150	6,390	4,640	920	1,315
17	4,940	390	1,585	7,860	3,040	2,660	2,270	1,040	3,440	3,080	850	1,190
18	4,790	375	1,510	17,800	2,840	3,310	2,070	920	2,270	2,455	960	1,060
19	3,690	385	3,190	23,320	2,620	4,240	1,845	900	1,660	2,160	1,745	1,030
20	2,360	345	11,420	13,690	2,375	6,650	1,700	850	1,465	2,105	3,690	1,060
21	1,825	345	11,220	9,450	2,305	6,060	1,615	755	1,275	1,860	3,560	2,000
22	1,370	365	8,850	7,080	2,160	4,880	1,540	800	1,190	1,600	3,290	1,825
23	1,370	350	6,710	6,360	2,035	4,090	1,410	780	1,115	1,355	2,250	1,660
24	1,000	360	10,820	7,560	2,070	3,640	1,370	850	960	1,140	1,570	1,370
25	900	360	54,000	7,430	2,145	3,310	1,275	850	890	1,060	1,315	1,115
26	900	370	45,200	6,710	1,980	3,080	1,190	950	800	970	1,150	1,000
27	800	335	15,660	6,000	1,860	2,800	1,115	1,660	840	890	1,060	920
28	850	345	9,770	5,410	1,795	2,640	1,080	1,900	1,105	840	1,370	870
29	705	345	9,370	4,730	.....	2,475	1,040	2,000	1,275	800	1,825	850
30	610	335	19,580	4,240	.....	2,360	1,000	1,825	1,980	790	1,825	1,630
31	525	.....	11,790	4,300	.....	2,660	.....	1,555	.....	705	1,615	.....

[a] Estimated.

Daily discharge, in second-feet, of Caney Fork near Rock Island, Tenn., for the years ending Sept. 30, 1912–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16												
1	21,480	1,330	3,560	29,220	9,650	2,415	4,080	1,870	2,230	950	1,690	690
2	18,800	1,210	3,190	41,800	9,650	6,550	3,760	1,690	1,690	840	2,140	1,250
3	9,170	1,190	2,970	26,260	7,820	9,930	3,440	1,690	1,960	790	2,140	1,390
4	6,580	1,200	2,560	14,190	6,390	7,700	3,020	1,960	2,780	790	2,140	1,250
5	10,440	1,060	2,475	10,440	5,410	6,390	2,890	2,330	1,780	740	2,050	1,010
6	9,250	950	2,305	9,050	5,090	5,250	2,660	2,050	1,530	740	1,690	950
7	6,450	950	2,125	15,290	4,640	5,415	2,540	1,870	2,780	600	1,610	890
8	4,560	900	1,945	21,180	3,960	7,360	3,150	1,690	2,780	1,010	1,610	740
9	3,440	890	1,825	13,340	4,730	6,060	4,560	1,530	1,960	12,300	2,050	740
10	2,970	900	1,660	10,040	8,090	5,090	4,560	1,460	1,460	31,200	2,230	740
11	2,560	900	1,585	7,700	6,710	4,640	4,400	1,390	1,960	21,600	1,690	654
12	2,180	930	1,660	7,700	5,740	4,210	3,920	1,250	7,040	19,500	1,500	600
13	2,000	1,965	1,915	29,000	5,090	3,690	3,600	1,190	9,780	16,100	2,050	636
14	1,915	4,270	1,945	23,920	4,790	3,310	3,150	1,130	6,470	15,100	2,230	890
15	1,880	49,800	2,090	12,320	3,960	3,190	2,890	1,010	4,240	8,260	2,050	2,230
16	2,000	25,260	10,020	9,970	3,690	3,190	2,660	1,010	3,150	7,230	1,710	1,870
17	1,980	12,050	14,070	8,850	3,310	2,860	2,430	1,010	2,540	6,090	1,530	1,460
18	1,810	8,190	43,300	7,050	2,970	2,180	2,230	890	2,330	7,230	1,460	1,010
19	2,510	15,980	24,700	6,060	2,600	2,455	2,140	840	1,870	5,390	1,250	840
20	7,820	16,600	12,480	5,410	2,455	2,360	1,690	840	1,690	6,090	1,250	790
21	6,780	10,820	8,450	4,790	2,270	2,180	2,430	790	2,330	8,050	1,130	740
22	4,760	7,790	7,050	13,260	2,145	2,180	4,080	890	2,140	8,680	1,010	645
23	3,640	6,000	5,410	27,000	2,180	2,090	3,440	1,130	1,780	6,850	1,070	555
24	3,060	4,850	4,500	15,050	2,660	1,915	2,890	1,610	1,530	5,040	1,070	470
25	2,455	4,030	8,850	10,040	2,970	1,825	2,660	1,610	1,360	3,600	1,010	430
26	2,105	3,500	17,850	8,040	2,560	3,580	2,430	1,320	1,230	3,150	1,010	510
27	1,915	5,740	12,050	6,550	2,560	9,340	2,330	1,130	1,180	2,780	950	555
28	1,795	5,410	11,220	5,740	2,475	10,700	2,230	950	1,050	3,440	840	600
29	1,660	4,790	40,000	4,790	2,360	8,050	2,140	890	974	2,540	790	555
30	1,510	4,210	30,100	4,500	.....	6,470	1,870	2,050	926	2,140	790	430
31	1,425	.....	14,630	4,560	.....	4,720	.....	3,150	.....	1,960	790	.....

NOTE.—Discharge Nov. 14, 1911, to Dec. 31, 1914, computed by the H. M. Billesby Engineering Co., Chicago, Ill., and determined from a rating curve based upon 50 current-meter measurements. Discharge Jan. 1, 1915, to Mar. 26, 1916, computed by the Tennessee Power Co., which used the Billesby rating curve. Records Mar. 27 to Sept. 30, 1916, collected and computed under supervision of U. S. Geological Survey in cooperation with Tennessee Power Co.

Monthly discharge of Caney Fork near Rock Island, Tenn., for the year ending Sept. 30, 1912.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1911–12.					
November 14–30	3,200	1,410	1,940	1.18	0.75
December	35,100	850	7,730	4.71	5.43
January	18,970	2,300	5,810	3.54	4.08
February	26,700	1,980	6,910	4.21	4.54
March	68,300	3,960	13,200	8.05	9.28
April	107,000	3,360	14,900	9.09	10.14
May	16,900	1,360	5,050	3.09	3.55
June	2,480	710	1,180	.720	.80
July	4,700	755	2,470	1.51	1.74
August	845	521	681	.415	.48
September	2,456	260	912	.556	.62
1912–13.					
October	1,900	330	671	0.409	0.47
November	570	270	353	.215	.24
December	8,400	330	1,710	1.04	1.20
January	87,000	4,210	16,100	9.82	11.32
February	40,700	2,940	8,160	4.98	5.19
March	78,000	2,980	15,400	9.39	10.83
April	6,680	1,187	3,500	2.13	2.38
June 7–30	4,700	400	1,180	.720	.64
July	1,255	243	432	.263	.30
August	522	243	319	.195	.22
September	325	310	310	.189	.21
1913–14.					
October	325	280	307	0.187	0.22
November	400	250	311	.190	.21
December	800	250	342	.209	.24
January	21,200	250	1,040	.634	.73
February	28,600	2,180	4,690	2.86	2.98
March	16,430	1,740	3,500	2.13	2.46
April	12,600	1,100	4,460	2.72	3.04
May	3,970	590	1,070	.652	.75
July 15–31	10,980	715	2,780	1.70	1.07
August	1,465	390	777	.474	.55
September	775	220	431	.263	.29
1914–15.					
October	10,820	220	1,420	0.866	1.00
November	495	335	401	.245	.27
December	54,000	470	8,800	5.37	6.19
January	27,000	3,690	8,700	5.30	6.11
February	39,500	1,795	7,170	4.37	4.55
March	6,650	1,615	3,160	1.93	2.22
April	4,210	1,000	2,300	1.40	1.56
May	2,000	755	1,080	.659	.76
June	6,390	800	1,730	1.05	1.17
July	16,230	705	3,320	2.02	2.33
August	3,690	585	1,360	.829	.96
September	15,050	850	2,470	1.51	1.68
The year	54,000	220	3,480	2.12	28.80
1915–16.					
October	21,480	1,425	4,870	2.97	3.42
November	49,800	890	6,790	4.14	4.62
December	43,300	1,585	9,630	5.87	6.77
January	41,800	4,500	13,300	8.11	9.35
February	9,650	2,145	4,450	2.71	2.92
March	10,700	1,825	4,750	2.90	3.34
April	4,560	1,690	3,010	1.84	2.05
May	3,150	790	1,430	.872	1.01
June	9,780	926	2,550	1.55	1.73
July	31,200	600	6,800	4.15	4.78
August	2,230	790	1,500	.915	1.05
September	2,230	430	871	.531	.59
The year	49,800	430	5,020	3.06	41.63

TENNESSEE RIVER BASIN.

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

LOCATION.—At highway bridge known as Smith's Bridge, about a mile below Southern Railway station at Asheville, N. C., and 2 miles below mouth of Swannanoa River.

DRAINAGE AREA.—987 square miles.

RECORDS AVAILABLE.—March 19, 1903 (determinations of daily discharge from January 1, 1905), to July 16, 1916.

GAGES.—Vertical staff attached to one of the bridge piers and an auxiliary chain gage attached to first panel to left of staff gage; bottom of staff gage at zero; chain gage used for readings below zero; both gages adjusted to same datum. Bridge was washed away July 16, 1916, by flood due to extremely heavy rains and to breaking of artificial lake dikes near headwaters.

DISCHARGE MEASUREMENTS.—Formerly made from downstream side of highway bridge.

CHANNEL AND CONTROL.—Bed composed chiefly of rock; practically permanent. Control formed by rock shoal and concrete piers of Southern Railway bridge; permanent, though piers of bridge may become choked with débris during extreme floods, so that stage-discharge relation at gage may be affected by backwater for short periods. Current good at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.6 feet at 0 a. m. July 16 (discharge not determined), the gage having been read a short time before the bridge went out. The high stage was probably due partly to backwater caused by jamming of drift on Southern Railway bridge (a concrete structure), which was entirely overflowed by the water. Many buildings on the river front were washed away. Minimum stage recorded during year, −0.2 foot May 21 and 22 (discharge, 1,190 second-feet).

1905–1916: Maximum stage recorded July 16, 1916; maximum stage recorded prior to that date, 7.8 feet January 23, 1906 (discharge, 25,800 second-feet); minimum stage recorded, −0.7 foot September 16 and 20, 1907 (discharge, 380 second-feet.)

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Slight diurnal fluctuations may be caused by the operation of small mills upstream.

ACCURACY.—Stage-discharge relation practically permanent. Gage read to tenths once daily. Rating curve well defined below 10,800 second-feet. Daily discharge ascertained by applying daily gage heights to rating table. Records only fair.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

No discharge measurements were made at this station during the year.

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Daily discharge, in second-feet, of French Broad River at Asheville, N. C., for the period ending July 16, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	5,660	1,710	1,940	9,070	4,150	2,600	1,940	1,490	2,060	1,710
2	6,140	1,710	1,940	5,200	9,070	2,910	1,940	1,490	1,820	1,940
3	3,590	1,710	1,820	4,550	9,360	3,410	1,820	1,490	1,820	1,940
4	2,460	1,600	1,820	3,770	7,690	3,240	2,750	1,490	1,820	1,820
5	4,980	1,600	1,710	3,590	7,690	2,750	2,320	1,490	1,710	1,820
6	5,900	1,490	1,710	3,410	4,350	2,600	2,600	1,390	1,600	1,710
7	3,960	1,600	1,710	3,410	3,770	2,600	2,320	1,390	6,640	1,600
8	3,590	1,600	1,710	3,240	3,410	2,910	2,750	1,390	6,390	1,710
9	3,590	1,600	1,710	3,240	3,240	2,600	3,240	1,390	4,150	11,800
10	2,320	1,600	1,600	3,070	3,070	2,460	2,600	1,390	2,600	18,200
11	2,060	1,490	1,600	2,910	2,910	2,320	2,460	1,290	2,320	25,100
12	2,060	1,490	1,710	2,750	2,750	2,320	2,190	1,290	3,590	17,600
13	2,060	1,490	1,710	3,070	2,750	2,190	2,190	1,290	3,240	11,800
14	1,940	1,600	1,710	3,590	2,600	2,060	2,060	1,290	2,460	9,360
15	2,320	1,600	1,600	2,910	2,460	2,320	1,940	1,290	3,410	9,360
16	2,320	1,710	1,710	2,750	2,460	2,190	2,060	1,290	4,150	.....
17	2,320	1,600	1,940	2,910	2,460	2,060	1,940	1,290	6,390	.....
18	2,190	1,490	13,000	2,460	2,460	1,940	1,940	1,290	3,410	.....
19	2,320	7,690	11,100	2,320	2,320	1,940	1,940	1,290	2,910	.....
20	3,960	6,900	9,650	2,320	2,320	1,820	1,710	1,290	2,460	.....
21	3,960	3,960	5,900	2,320	2,190	1,940	1,710	1,190	2,460	.....
22	3,240	2,910	3,590	2,460	2,190	1,940	1,710	1,190	2,320	.....
23	2,750	2,460	3,240	4,150	2,060	1,820	1,710	3,590	1,940	.....
24	2,460	2,190	2,600	3,240	2,320	1,820	1,600	10,200	2,190	.....
25	2,320	2,060	3,070	2,750	4,760	1,820	1,600	8,510	2,320	.....
26	2,190	2,060	2,910	2,750	3,240	1,820	1,600	4,760	2,060	.....
27	2,190	2,750	2,600	3,770	2,750	2,600	1,600	2,910	1,940	.....
28	1,940	2,190	2,460	3,410	2,600	2,750	1,600	2,320	1,940	.....
29	1,820	2,320	15,200	3,240	2,600	2,190	1,600	2,320	1,820	.....
30	1,820	2,060	14,300	3,240	.....	2,060	1,600	2,460	1,940	.....
31	1,820	.....	11,800	2,750	.....	1,940	.....	2,460	.....	.....

Monthly discharge of French Broad River at Asheville, N. C., for the period ending July 16, 1916.

[Drainage area, 987 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	6,140	1,820	2,980	3.02	3.48
November	7,690	1,490	2,270	2.30	2.57
December	15,200	1,600	4,230	4.29	4.95
January	9,070	2,320	3,370	3.41	3.93
February	9,360	2,060	3,660	3.71	4.00
March	3,410	1,820	2,320	2.35	2.71
April	3,240	1,600	2,030	2.06	2.30
May	10,200	1,190	2,230	2.26	2.61
June	6,640	1,600	2,860	2.90	3.24
July 1–15	25,100	1,600	7,830	7.93	4.42

TENNESSEE RIVER AT CHATTANOOGA, TENN.

LOCATION.—In the city of Chattanooga, Hamilton County, 3 miles above mouth of Chattanooga Creek, 4 miles below mouth of Chickamauga Creek, and 33 miles upstream from Hales Bar dam.

DRAINAGE AREA.—21,400 square miles (measured on topographic maps).

RECORDS AVAILABLE. April 1, 1874, to October 21, 1913; March 1, 1915, to September 30, 1916.

GAGES.—Two gages, 7 miles apart and set to same datum, are used at this station to determine variation in slope of water surface caused by operation of power plant and locks at Hales Bar dam, as the station is within influence of backwater from the dam. Gage No. 1 consists of a sloping section of iron (railroad T rail) bolted to rock, and a vertical section of timber attached to the rock cliff on the left bank about 200 feet upstream from the Walnut Street bridge; this gage is read by O. B. Gladish. Gage No. 2 is a vertical staff in three sections, fastened to trees on left bank about 100 feet above the Cincinnati Southern Railroad bridge 7 miles upstream from Chattanooga; gage is read by Walter Ashworth.

Prior to October 21, 1913, gage No. 1 was used alone, but on that date backwater from Hales Bar dam began to affect the stage-discharge relation, and the station was abandoned until March 1, 1915, when gage No. 2 was installed.

DISCHARGE MEASUREMENTS.—Made from downstream footway of Walnut Street bridge.

CHANNEL AND CONTROL.—Channel practically permanent. Control now formed by Hales Bar lock and dam and power plant.

EXTREMES OF DISCHARGE.—Maximum stage during year, from records of United States Weather Bureau, 30.4 feet at noon July 20 (discharge, 164,000 second-feet); minimum stage recorded, 5.31 feet November 9 (discharge, 12,300 second-feet).

1874–1916: Maximum stage recorded, 54.0 feet at 7 a. m., March 1, 1875 (discharge, 361,000 second-feet); minimum stage recorded, zero on gage September 11–14, 1881, and September 19, 1883 (discharge, 4,800 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—*See* Accuracy.

ACCURACY.—Stage-discharge relation affected by changes in slope of water surface caused by operation of power plant at Hales Bar dam and by rising and falling stages. Discharge determined by slope method (see Water-Supply Paper 345). High-stage measurements made in March, 1917, were used in construction of rating curve, which is well defined between 11,500 and 363,000 second-feet. Gages read to hundredths twice daily, but means are subject to errors due to diurnal fluctuations. Records good.

Discharge measurements of Tennessee River at Chattanooga, Tenn., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height in feet.		Discharge in sec.-ft.
		Gage No. 1.	Gage No. 2.	
Oct. 6	L. J. Hall	18.58	21.52	81,900
7	do	16.55	19.37	65,400
Jan. 11	do	25.75	28.81	129,000
15	do	20.57	23.62	94,000
May 10[a]	W. E. Hall and L. J. Hall	8.77	11.24	17,900

[a] Three-foot flashboards on Hales Bar dam.

Daily discharge, in second-feet, of Tennessee River at Chattanooga, Tenn., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	30,600	14,400	29,400	166,000	50,600	52,000	53,500	20,500	44,500	18,200	38,800	15,500
2	44,300	14,400	27,700	155,000	64,400	50,900	49,800	19,500	38,900	18,100	34,700	15,800
3	52,600	13,800	25,400	136,000	104,000	57,700	44,100	18,900	32,400	17,500	34,800	17,500
4	57,800	13,500	23,400	122,000	133,000	66,600	40,300	18,900	31,200	16,900	35,300	18,300
5	84,200	13,200	21,800	98,800	126,000	69,600	37,800	19,200	31,000	16,700	41,200	17,500
6	73,900	12,900	20,000	84,400	110,000	70,000	35,900	19,400	27,100	17,600	43,400	17,300
7	64,100	12,700	19,200	74,300	87,800	67,500	34,800	19,400	33,900	16,500	38,000	16,400
8	48,300	12,400	18,700	87,800	76,400	61,700	38,500	18,800	39,600	18,100	39,600	15,100
9	40,300	12,300	18,100	124,000	63,900	62,300	42,800	18,000	41,000	45,700	50,200	15,200
10	33,400	12,500	17,200	130,000	60,200	62,900	47,000	17,700	38,600	134,000	55,500	14,500
11	27,200	12,400	16,900	126,000	62,200	62,600	45,500	17,300	34,100	130,000	48,600	14,000
12	24,400	12,700	18,300	99,600	62,000	57,700	42,800	16,200	33,300	146,000	43,800	14,800
13	21,600	13,000	19,600	84,600	59,600	50,100	42,500	14,900	42,900	133,000	42,200	14,900
14	20,100	13,200	20,800	92,300	56,500	45,500	42,400	14,700	48,900	104,000	40,400	14,000
15	19,700	32,100	20,100	92,900	53,400	42,000	41,400	15,000	42,100	79,200	40,700	14,100
16	18,500	74,700	23,900	85,800	48,900	38,700	40,900	16,000	36,300	59,000	41,600	14,600
17	17,600	66,100	29,300	77,400	45,900	36,700	37,400	15,500	44,400	54,500	41,400	17,100
18	17,300	54,000	80,000	70,000	42,000	35,300	34,200	14,800	46,300	85,900	45,200	14,600
19	18,300	57,000	150,000	62,600	39,400	32,800	30,700	15,000	44,400	128,000	66,800	14,000
20	23,000	57,400	183,000	55,700	36,800	30,300	28,300	14,900	39,900	161,000	62,300	14,000
21	24,000	56,300	177,000	49,800	34,200	29,400	27,500	14,600	36,500	128,000	43,900	13,600
22	24,700	51,900	159,000	56,300	32,900	27,900	30,000	14,700	32,900	102,000	36,800	13,700
23	23,000	49,900	93,700	84,900	31,100	27,400	29,800	15,300	29,600	104,000	30,300	13,100
24	23,100	43,800	70,600	99,600	31,000	28,400	27,400	18,700	27,000	91,400	29,600	12,700
25	20,700	36,600	55,400	93,400	32,500	29,600	26,000	45,000	24,700	82,500	31,200	12,000
26	19,500	31,300	53,800	82,600	38,500	29,900	24,800	47,000	23,400	74,800	26,200	11,700
27	18,800	31,800	57,100	72,600	53,100	29,700	24,000	41,500	24,900	62,500	24,200	11,500
28	17,600	31,600	56,600	62,300	62,600	33,700	23,600	34,400	23,900	55,900	20,200	11,900
29	16,900	31,400	77,100	56,300	59,900	44,700	22,900	28,200	21,400	51,200	18,100	12,200
30	15,800	30,600	141,000	52,800	.....	46,800	22,700	26,800	19,800	47,200	17,000	12,100
31	14,800	.....	168,000	47,500	.....	50,300	.....	34,600	.....	43,200	16,500	.....

Monthly discharge of Tennessee River at Chattanooga, Tenn., for the year ending Sept. 30, 1916.

[Drainage area, 21,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	84,200	14,800	30,800	1.44	1.66
November	74,700	12,300	30,700	1.43	1.60
December	183,000	16,900	61,000	2.85	3.29
January	166,000	47,500	89,800	4.20	4.84
February	133,000	31,000	60,600	2.83	3.05
March	70,000	27,400	46,200	2.16	2.49
April	53,500	22,700	35,600	1.66	1.85
May	47,000	14,600	21,500	1.00	1.15
June	48,900	19,800	34,500	1.61	1.80
July	161,000	16,500	72,300	3.38	3.90
August	66,800	16,500	38,000	1.78	2.05
September	18,300	11,500	14,500	.678	.76
The year	183,000	11,500	44,700	2.09	28.44

TENNESSEE RIVER AT FLORENCE, ALA.

LOCATION.—At Southern Railway bridge at lower end of Pattons Island, just below foot of Little Muscle Shoals, 1 mile south of Florence, Lauderdale County.

DRAINAGE AREA.—30,800 square miles.

RECORDS AVAILABLE.—November 7, 1871, to September 30, 1916.

GAGE.—Rod gage consisting of four sections of steel, three-eighths inch by 7½ inches, attached to right face of stone draw pier, which has batter of 1 inch to the foot. These sections form one continuous gage, graduated from −1.92 to 33.5 feet. Zero of gage, 400.85 feet above sea level. Gage read by R. E. Coburn. For description of gages used prior to September 30, 1913, see Water-Supply Paper 353, p. 151.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway section (the low level or through section) of 17-span combined railway and highway bridge. Special care necessary to counteract effect of obstruction of current by piers.

CHANNEL AND CONTROL.—Bed rocky, rough, and uneven; probably permanent. Discharge measurements made through a period of 28 years indicate that control is probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 25.50 feet, morning reading, July 12 (discharge, 332,000 second-feet); minimum stage, 0.3 foot September 30, morning and afternoon reading (discharge, 12,300 second-feet).

1871–1916: Maximum stage recorded, 32.5 feet at 10 and 12 p. m., March 19, 1897 (discharge, 499,000 second-feet); minimum stage, −0.80 foot September 18, 1878 (discharge, 7,350 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—The operation of Hales Bar lock and dam, 175 miles upstream, may cause some diurnal fluctuation in low-stage flow.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined above 12,300 second-feet. Gage read to tenths twice daily; oftener during high water. Daily discharge ascertained by applying mean daily gage heights to rating table. Records good.

COOPERATION.—Gage-height record furnished by Mississippi River Commission.

Discharge measurements of Tennessee River at Florence, Ala., during the year ending Sept. 30, 1916.

[Made by L. J. Hall.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 1	1.49	19,900	Jan. 13	14.62	166,000
3	4.57	47,300	14	15.17	173,000
5	8.08	81,900	Sept. 8	1.47	19,800
Dec. 14	2.05	22,700			

Daily discharge, in second-feet, of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20,200	20,200	43,700	205,000	90,200	74,400	56,100	32,600	36,000	27,700	55,200	25,400
2	32,600	18,800	42,000	226,000	91,400	83,200	58,800	32,600	36,000	27,700	51,600	22,400
3	42,000	18,200	38,600	232,000	87,800	91,400	62,400	31,800	42,800	26,900	48,900	20,200
4	62,400	16,300	36,900	228,000	96,200	90,200	63,300	31,000	44,600	23,100	46,200	18,800
5	78,800	16,300	34,400	221,000	120,000	87,800	58,800	31 000	37,800	24,600	44,600	17,500
6	87,800	16,300	31,000	208,000	135,000	90,200	53,400	30,100	36,000	25,400	42,800	20,200
7	95,000	15,100	29,300	187,000	146,000	91,400	49,800	26,100	36,000	27,700	43,700	20,200
8	92,600	15,100	27,700	154,000	143,000	92,600	50,700	24,600	37,800	82,100	48,000	19,500
9	79,900	15,100	26,100	124,000	126,000	90,200	51,600	23,100	36,000	169,000	49,800	18,800
10	62,400	15,100	24,600	114,000	109,000	83,200	51,600	23,100	40,300	187,000	48,900	17,500
11	50,700	14,500	23,100	133,000	97,400	78,800	53,400	23,100	43,700	224,000	55,200	16,900
12	42,000	15,700	23,100	143,000	91,400	76,600	55,200	23,100	47,100	292,000	58,800	16,300
13	37,800	20,900	23,100	160,000	85,400	76,600	57,000	23,100	56,100	250,000	56,100	16,300
14	32,600	23,100	23,100	169,000	82,100	71,300	57,000	21,600	52,500	237,000	53,400	16,300
15	31,000	43,700	24,600	159,000	77,700	64,300	56,100	20,900	58,800	234,000	52,500	16,300
16	28,500	60,600	27,700	152,000	72,300	60,600	53,400	20,900	63,300	213,000	48,900	16,900
17	26,100	72,300	33,500	143,000	66,300	55,200	49,800	21,600	57,900	182,000	48,000	16,300
18	25,400	96,200	64,300	131,000	62,400	51,600	48,000	21,600	54,300	145,000	47,100	16,300
19	25,400	109,000	99,800	111,000	59,700	48,000	46,200	20,200	51,600	120,000	47,100	16,300
20	26,100	105,000	139,000	95,000	55,200	45,400	44,600	20,200	49,800	127,000	49,800	16,900
21	32,600	90,200	160,000	81,000	53,400	43,700	45,400	19,500	56,100	150,000	62,400	17,500
22	37,800	82,100	178,000	90,200	49,800	41,200	48,000	19,500	55,200	164,000	63,300	17,500
23	36,000	78,800	187,000	136,000	47,100	39,400	49,800	21,600	52,500	166,000	55,200	16,300
24	34,400	67,300	191,000	154,000	46,200	38,600	49,800	29,300	48,900	154,000	47,100	16,300
25	32,600	62,400	190,000	159,000	44,600	37,800	47,100	31,000	46,200	154,000	40,300	15,700
26	29,300	57,900	167,000	159,000	42,800	39,400	42,800	29,300	42,800	122,000	36,900	15,100
27	27,700	58,800	127,000	145,000	41,200	42,800	39,400	32,600	37,800	99,800	36,000	13,900
28	25,400	50,700	108,000	127,000	44,600	48,900	37,800	46,200	34,400	78,800	34,400	13,400
29	23,100	48,000	133,000	109,000	57,900	49,800	36,000	46,200	31,000	75,500	36,000	12,800
30	22,400	46,200	163,000	87,800	.....	49,800	34,400	46,200	29,300	67,300	34,400	12,300
31	21,600	.....	182,000	83,200	.....	53,400	.....	40,300	.....	61,500	27,700	.....

Monthly discharge of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1916.

[Drainage area, 30,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	95,000	20,200	42,000	1.36	1.57
November	109,000	14,500	45,700	1.48	1.65
December	191,000	23,100	83,900	2.72	3.14
January	232,000	83,200	149,000	4.84	5.58
February	146,000	41,200	80,100	2.60	2.80
March	92,600	37,800	64,100	2.08	2.40
April	63,300	34,400	50,300	1.63	1.82
May	46,200	19,500	27,900	.906	1.04
June	63,300	29,300	45,100	1.46	1.63
July	292,000	23,100	127,000	4.12	4.75
August	63,300	27,700	47,400	1.54	1.78
September	25,400	12,300	17,200	.558	.62
The year	292,000	12,300	65,200	2.12	28.78

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

LOCATION.—At highway bridge at Bluff City, Sullivan County, 300 feet below Virginia & Southwestern Railway bridge, 1 mile below the mouth of Indian Creek, and about 10 miles upstream from mouth of Watauga River.

DRAINAGE AREA.—828 square miles.

RECORDS AVAILABLE.—July 17, 1900, to September 30, 1916.

GAGE.—Vertical staff attached to downstream side of bridge pier nearest the right bank.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge; also from railroad bridge 300 feet upstream, where the section is much better except at low stages, when the current becomes sluggish.

CHANNEL AND CONTROL.—Bed of river very rough. Control consists of a shallow ledge, probably permanent. Depth and velocity of current very irregular.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10 feet at 12 p. m. January 7 (discharge, 17,300 second-feet); minimum stage recorded, 0.3 foot at 7 a. m. July 8 (discharge, 285 second-feet).

1900–1916: Maximum stage recorded, 11.45 feet February 28, 1902 (discharge, 33,000 second-feet); minimum stage recorded, −0.1 foot October 16 to 19, 21 to 25, 26, 28 to 31, and November 1, 1904 (discharge, 150 second-feet).

ICE.—Stage-discharge relation not affected by ice.

REGULATION.—Operation of small mills upstream causes some diurnal fluctuation in stage.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined below 25,700 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. As no discharge measurements have been made at this station since October, 1914, accuracy of the records is doubtful.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Daily discharge, in second-feet, of South Fork of Holston River at Bluff City, Tenn., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,370	420	650	2,630	1,680	1,790	2,370	860	475	475	940	590
2	3,910	420	650	2,500	5,260	2,370	2,130	860	475	420	1,680	590
3	2,500	420	590	2,900	7,830	3,040	1,790	785	420	420	1,480	590
4	1,790	420	590	2,370	4,390	4,730	1,680	860	420	530	1,020	785
5	1,380	420	530	2,010	3,180	3,460	1,480	785	420	370	940	715
6	1,480	370	530	2,370	2,630	2,900	1,790	785	420	325	2,370	650
7	1,280	370	475	5,620	2,250	3,040	1,790	715	475	325	2,500	590
8	1,190	370	475	16,300	2,010	4,900	2,130	650	475	285	2,900	530
9	1,020	420	475	6,380	1,790	3,760	2,500	650	420	325	2,130	530
10	860	420	475	4,220	2,630	2,760	2,130	590	420	475	2,130	530
11	860	370	475	3,460	2,130	2,370	1,900	590	420	475	1,790	475
12	785	370	650	3,040	1,900	2,010	2,500	590	420	530	2,250	475
13	715	420	650	2,760	1,790	1,790	2,760	530	475	530	1,680	420
14	715	475	715	3,180	1,790	1,680	2,250	530	420	420	2,250	420
15	650	715	590	2,760	1,680	1,580	1,900	530	420	475	2,630	475
16	590	1,020	940	2,370	1,580	1,480	1,680	530	475	6,580	12,700	940
17	530	860	5,620	2,370	1,380	1,380	1,480	530	715	8,490	6,780	650
18	530	785	11,300	2,010	1,280	1,280	1,380	475	650	5,080	3,320	530
19	590	650	11,500	1,790	1,190	1,190	1,280	475	530	3,320	2,250	530
20	590	1,380	4,730	1,790	1,190	1,280	1,100	475	475	2,250	1,900	475
21	590	1,380	3,040	1,680	1,190	1,280	1,100	475	475	4,900	1,480	420
22	530	1,280	2,370	1,790	1,100	1,380	1,100	530	420	4,560	1,380	420
23	530	1,100	1,790	3,910	1,020	1,380	1,020	650	420	3,610	1,900	370
24	530	940	1,680	3,320	1,100	1,280	940	1,020	370	2,130	1,480	370
25	475	785	1,480	2,630	5,800	1,280	940	785	420	1,680	1,280	370
26	475	715	2,370	2,130	3,910	1,380	1,020	650	475	1,190	1,100	325
27	475	785	2,010	1,900	2,900	1,380	1,020	590	475	1,790	860	325
28	475	785	1,790	1,790	2,250	4,220	1,020	530	420	2,250	715	370
29	420	715	3,320	1,580	2,130	4,060	940	475	370	1,680	590	715
30	420	650	6,180	1,480	.....	3,180	940	475	325	1,380	650	650
31	420	.....	3,610	1,480	.....	2,630	.....	530	.....	1,020	650	.....

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for the year ending Sept. 30, 1916.

[Drainage area, 828 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	3,910	420	957	1.16	1.34
November	1,380	370	674	.814	.91
December	11,500	475	2,330	2.81	3.24
January	16,300	1,480	3,110	3.76	4.34
February	7,830	1,020	2,450	2.96	3.19
March	4,900	1,190	2,330	2.81	3.24
April	2,760	940	1,600	1.93	2.15
May	1,020	475	629	.760	.88
June	715	325	453	.547	.61
July	8,490	285	1,880	2.27	2.62
August	12,700	590	2,180	2.63	3.03
September	940	325	528	.638	.71
The year	16,300	285	1,600	1.93	26.26

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

LOCATION.—At Virginia & Southwestern Railway bridge near Austins Mill, Hawkins County, half a mile below new county highway bridge, 2 miles downstream from mouth of Dodson Creek, 3 miles south of Rogersville, and 11 miles northeast from Bulls Gap, Tenn.

DRAINAGE AREA.—3,060 square miles.

RECORDS AVAILABLE.—March 10, 1902 (daily discharge record beginning January 1, 1904), to September 30, 1916.

GAGE.—Vertical staff attached to right side of bridge pier nearest right bank.

DISCHARGE MEASUREMENTS.—Made from the steel highway bridge about half a mile upstream from gage.

CHANNEL AND CONTROL.—Bed of stream composed of solid rock, boulders and gravel. Right bank high and not subject to overflow; left bank high but subject to overflow at extremely high stages. Control formed by rock shoals below bridge; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.4 feet at 8 a. m. July 17 (discharge, 49,800 second-feet); minimum stage recorded, 1.5 feet at 8 a. m. November 4, 5, 7, 8, 9, 11 and 12 (discharge, 1,030 second-feet).

1904–1916: Maximum stage recorded, 19.1 feet March 28, 1913 (discharge, about 67,000 second-feet); minimum stage recorded, 1.0 foot October 23 to November 3, 1904 (discharge, 490 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice.

REGULATION.—Operation of power plants a long distance upstream cause some diurnal fluctuations in stage.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during the year. Rating curve well defined below 33,000 second-feet; extended above that point; up to 10,000 second-feet coincides with curve used from 1911 to 1915; above 10,000 second-feet revised and slightly changed by means of flood data obtained in March, 1917. Gage read to tenths once daily (morning). Daily discharge ascertained by applying daily gage heights to rating table.

Discharge measurements of Holston River near Rogersville, Tenn., during the year ending Sept. 30, 1916.

[Made by L. J. Hall.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 23	1.72	1,480
Sept. 7	1.84	1,640

Daily discharge, in second-feet, of Holston River near Rogersville, Tenn., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6,840	1,210	2,150	9,850	5,630	6,530	8,120	3,000	2,150	1,390	3,230	1,950
2	11,000	1,210	1,950	9,140	11,700	7,470	7,150	2,780	1,950	1,760	2,780	1,760
3	8,800	1,210	1,950	9,140	25,500	8,800	6,230	2,560	1,760	1,760	4,230	1,950
4	5,340	1,030	1,760	9,140	18,000	12,400	5,630	2,560	1,570	1,390	3,720	1,950
5	3,970	1,030	1,760	7,150	11,300	11,300	5,340	2,780	1,570	1,950	3,230	1,950
6	3,470	1,210	1,760	6,840	8,800	9,490	5,340	2,780	1,570	1,570	5,340	1,760
7	3,720	1,030	1,760	15,400	7,790	8,460	5,630	2,560	1,950	1,570	6,530	1,760
8	3,230	1,030	1,760	38,000	6,840	11,300	6,530	2,150	1,950	1,390	7,470	1,760
9	2,780	1,030	1,570	27,400	6,530	12,800	8,120	1,950	1,760	1,760	8,460	1,760
10	2,780	1,210	1,570	14,300	7,790	9,140	8,120	2,150	1,760	2,150	7,470	1,760
11	2,560	1,030	1,390	11,000	7,790	7,470	6,530	1,950	1,570	10,200	6,530	1,760
12	2,560	1,030	1,570	9,850	6,840	6,840	6,840	1,950	1,760	4,500	5,930	1,570
13	1,950	1,210	2,350	12,100	6,230	5,930	7,790	1,760	1,760	3,000	6,840	1,570
14	1,570	1,570	2,560	11,700	6,230	5,340	7,790	1,760	1,950	2,560	9,140	1,570
15	1,570	3,720	2,350	9,490	5,930	5,050	6,530	1,760	2,150	1,950	6,840	1,760
16	1,570	3,720	3,720	8,120	5,050	5,340	5,630	1,570	1,760	2,150	10,600	1,760
17	1,390	3,230	8,120	7,470	4,770	4,500	4,770	1,570	2,780	49,800	25,100	2,780
18	1,390	2,560	23,600	6,840	4,500	4,230	4,500	1,570	3,000	24,000	12,400	1,950
19	1,390	2,560	49,000	5,340	4,230	3,970	4,230	1,570	2,350	13,900	7,790	1,570
20	1,570	3,000	20,200	4,770	3,970	3,970	3,970	1,570	2,150	9,850	5,930	1,570
21	1,570	4,770	11,300	4,770	3,720	4,230	3,470	1,570	1,950	13,900	4,770	1,570
22	1,950	3,720	7,470	5,930	3,470	4,770	3,470	1,390	1,760	12,100	3,970	1,390
23	1,760	3,230	6,230	9,850	3,470	5,340	3,230	1,950	1,760	18,400	3,720	1,390
24	1,390	2,560	5,050	11,000	4,770	4,770	3,000	2,350	1,570	10,200	3,970	1,390
25	1,390	2,350	4,770	8,800	10,600	4,500	3,000	3,470	1,760	8,120	3,970	1,390
26	1,390	2,150	5,340	7,470	16,900	4,230	3,000	2,780	1,760	6,530	3,470	1,210
27	1,210	2,150	6,530	6,530	11,000	4,500	3,470	1,950	1,760	5,050	2,560	1,210
28	1,390	2,350	5,630	5,930	8,120	6,530	3,470	1,760	1,570	6,840	2,350	1,210
29	1,390	2,560	12,400	5,630	6,840	12,800	3,470	1,760	1,570	5,050	2,350	1,950
30	1,390	2,350	27,000	4,770	.....	12,100	3,230	2,350	1,570	5,050	2,150	1,950
31	1,390	.....	15,800	4,770	.....	9,140	.....	2,350	.....	3,970	1,950	.....

Monthly discharge of Holston River near Rogersville, Tenn., for the year ending September 30, 1916.

[Drainage area, 3,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	11,000	1,210	2,760	0.902	1.04
November	4,770	1,030	2,100	.686	.77
December	49,000	1,390	7,750	2.53	2.92
January	38,000	4,770	9,950	3.25	3.75
February	25,500	3,470	8,080	2.64	2.85
March	12,800	3,970	7,200	2.35	2.71
April	8,120	3,000	5,250	1.72	1.92
May	3,470	1,390	2,130	.696	.80
June	3,000	1,570	1,880	.614	.68
July	49,800	1,390	7,540	2.46	2.84
August	25,100	1,950	5,960	1.95	2.25
September	2,780	1,210	1,700	.556	.62
The year	49,800	1,030	5,200	1.70	23.15

HIWASSEE RIVER AT MURPHY, N. C.

LOCATION.—At highway bridge 100 feet upstream from Louisville & Nashville Railroad bridge, 300 feet from railroad station, which is on right side of river, four blocks from Murphy post office, Cherokee County, and half a mile upstream from mouth of Valley River.

DRAINAGE AREA.—410 square miles.

RECORDS AVAILABLE.—June 26, 1896, to August 8, 1897; October 19, 1897, to September 30, 1916.

GAGE.—Chain gage attached to downstream side of bridge, read by Miss Willie Mingus.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—At gage the bed is mostly solid rock and river is confined by masonry bridge abutments. Below gage the bed of stream is composed largely of sand and gravel. Low-water control is formed by a gravel and boulder riffle; high-water control formed partly by masonry piers of railroad bridge and the riffles below; control is changeable owing to shifting of material that forms upper riffle.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.8 feet at 8 a. m. December 29 (discharge, 15,000 second-feet); minimum stage recorded, 5.25 feet at 8 a. m. November 3, 11 and 12, and September 25, 26, 27 and 28 (discharge, 408 second-feet).

1896–1916: Maximum stage recorded, 18.4 feet March 19, 1899 (discharge, 22,400 second-feet); minimum stage recorded, 4.8 feet September 18, 1914 (discharge, 140 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Negligible.

ACCURACY.—Stage-discharge relation changed during flood December 18, 1915. Rating curve used before December 18 fairly well defined below 3,700 second-feet; curve used after that date fairly well defined below 3,700 second-feet. Stage-discharge relation not affected by ice. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records only fair.

Discharge measurements of Hiwassee River at Murphy, N. C., during the year ending Sept. 30, 1916.

[Made by L. J. Hall.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 19	5.50	532	Jan. 4	6.43	1,370
20	6.62	1,670	Aug. 28	5.62	689
Dec. 9	5.31	432			

Daily discharge, in second-feet, of Hiwassee River at Murphy, N. C., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,930	428	460	1,940	3,310	1,080	805	590	850	630	1,340	630
2	930	428	460	1,670	7,770	1,720	760	590	760	805	2,750	590
3	605	365	460	1,620	3,700	1,620	850	590	805	670	1,440	760
4	460	395	460	1,340	2,420	1,390	895	590	760	590	1,300	630
5	845	395	428	1,340	1,940	1,260	805	590	715	760	1,520	590
6	2,000	395	428	1,440	1,720	1,160	895	550	670	510	1,340	590
7	930	395	428	1,480	1,570	1,160	805	550	1,390	510	2,420	550
8	765	395	395	1,570	1,440	1,300	985	550	895	940	1,300	550
9	605	395	395	1,480	1,390	1,160	940	510	760	5,540	1,300	550
10	530	395	395	1,340	1,390	1,120	895	510	805	11,700	1,440	670
11	530	365	395	1,390	1,300	1,080	850	510	850	5,970	1,340	590
12	460	365	605	1,390	1,260	1,030	850	475	1,260	4,100	1,260	510
13	460	395	568	2,270	1,210	985	805	475	1,030	2,930	1,120	510
14	395	568	495	1,520	1,160	940	760	1,030	850	2,270	1,160	510
15	765	605	460	1,480	1,120	940	760	550	3,310	1,720	1,160	590
16	530	765	888	1,440	1,080	940	715	510	1,570	1,820	1,030	510
17	460	460	888	1,570	1,080	895	850	475	1,770	2,750	940	475
18	645	1,810	14,400	1,300	1,030	850	850	475	1,340	2,420	985	475
19	460	1,700	3,900	1,260	985	850	715	510	1,120	6,630	895	475
20	1,530	975	2,000	1,160	940	805	670	475	1,030	3,310	850	475
21	1,060	765	1,570	1,160	940	850	805	440	895	2,750	850	440
22	845	685	1,340	1,300	940	850	760	590	805	3,310	805	440
23	765	605	1,210	2,270	940	760	670	3,700	850	3,310	895	440
24	645	568	1,120	1,720	1,210	760	670	5,750	760	2,580	760	440
25	605	530	1,030	1,520	1,080	760	715	2,270	985	2,270	760	408
26	530	530	1,210	1,440	985	805	670	1,570	940	1,820	670	408
27	530	530	1,080	1,340	940	1,300	670	1,300	1,210	2,420	670	408
28	495	530	1,030	1,340	940	1,030	630	1,080	805	2,000	630	408
29	460	530	15,000	1,300	1,080	940	630	1,160	940	1,820	590	1,940
30	460	460	4,500	1,210	.....	850	590	1,030	1,770	1,570	760	590
31	428	.....	2,420	1,160	.....	850	.....	1,030	.....	1,440	630	.....

Monthly discharge of Hiwassee River at Murphy, N. C., for the year ending Sept. 30, 1916

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	2,930	395	763	1.86	2.14
November	1,810	365	591	1.44	1.61
December	15,000	395	1,950	4.76	5.49
January	2,270	1,160	1,480	3.61	4.16
February	7,770	940	1,620	3.95	4.26
March	1,720	760	1,030	2.51	2.89
April	985	590	776	1.89	2.11
May	5,750	440	1,000	2.44	2.81
June	3,310	670	1,080	2.63	2.93
July	11,700	510	2,640	6.44	7.42
August	2,750	590	1,130	2.76	3.18
September	1,940	408	572	1.40	1.56
The year	15,000	365	1,220	2.98	40.56

VALLEY RIVER AT TOMOTLA, N. C.

LOCATION.—At steel highway bridge 600 feet from Tomotla post office, Cherokee County, which is on Southern Railway 5 miles northeast of Murphy, N. C. Station is half a mile upstream from Rodgers Creek and 1 mile downstream from Colvards Creek.

DRAINAGE AREA.—120 square miles.

RECORDS AVAILABLE.—June 29, 1904, to December 31, 1909; January 21, 1914, to September 30, 1916.

GAGE.—In two sections; lower section, reading 0.0 to 5.4 feet, is on a sloping timber which is bolted to marble bedrock; upper section, 5.4 to 10.0 feet, is a vertical staff bolted to timber on old bridge pier; this is the same gage that was in use when station was discontinued in 1909. Gage read by J. T. Hayes.

DISCHARGE MEASUREMENTS.—Made from new single-span steel bridge over site of old footbridge.

CHANNEL AND CONTROL.—Bed of channel composed of gravel, which shifts during big floods. Control, which was at first thought to be a permanent rock ledge just below bridge, now seems to be partly formed by gravel bars in conjunction with the ledge; shifts during great floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.2 feet at 7 a. m. December 18 and 29 (discharge, 3,910 second-feet); minimum stage recorded, 1.0 foot at 7 a. m. and 6 p. m. September 24 to 26 (discharge, 60 second-feet).

1904–1909 and 1914–1916: Maximum stage recorded, 17.3 feet November 19, 1906 (discharge, about 10,400 second-feet); minimum stage recorded, 0.7 foot October 28 to November 2, 1904 (discharge, 22 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Very little diurnal fluctuation caused by operation of small mills upstream.

ACCURACY.—Stage-discharge relation changed during high water in December, 1915. Rating curve used January 1 to December 28, 1915, not well defined; curve used after that date fairly well defined between 60 and 400 second-feet; upper parts of both curves are extensions and are not considered accurate. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating tables. Determinations of discharge, January 1 to September 30, 1915, as published in Water-Supply Paper 403, have been revised owing to a revision of the rating curve above 140 second-feet. Results January 1 to December 28, 1915, fair below and poor above 200 second-feet. Records after December 28, 1915, fair for stages below 500 second-feet; above that point curve is poorly defined.

Discharge measurements of Valley River at Tomotla, N. C., during the year ending Sept. 30, 1916.

[Made by L. J. Hall.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 19	1.56	149
Jan. 5	2.33	362
Aug. 29	1.31	116
29	1.31	113

Daily discharge, in second-feet, of Valley River at Tomotla, N. C., for the period Jan. 1, 1915, to Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915.												
1	.....	.....	.....	340	1,420	226	202	116	136	90	82	90
2	.....	.....	.....	301	1,120	226	202	98	126	126	82	75
3	.....	.....	.....	275	705	214	202	136	116	107	68	56
4	.....	.....	.....	262	530	800	202	126	98	116	68	62
5	.....	.....	.....	226	477	623	190	116	98	750	68	98
6	.....	.....	.....	412	428	477	179	116	98	275	68	90
7	.....	.....	.....	530	368	428	179	116	98	179	68	75
8	.....	.....	.....	397	354	340	179	623	98	168	68	68
9	.....	.....	.....	340	301	301	179	368	98	146	68	68
10	.....	.....	.....	288	288	275	179	301	82	226	68	68
11	.....	.....	.....	288	275	275	179	226	82	214	68	68
12	.....	.....	.....	368	250	238	327	238	82	136	68	56
13	.....	.....	.....	340	250	226	179	214	82	126	75	68
14	.....	.....	.....	301	238	226	179	202	126	107	82	56
15	.....	.....	.....	314	288	202	157	168	314	168	68	56
16	.....	.....	.....	288	340	262	157	157	168	157	68	56
17	.....	.....	.....	428	314	226	146	168	107	116	62	51
18	.....	.....	.....	412	275	202	136	146	126	146	62	46
19	.....	.....	.....	397	250	202	136	136	98	98	90	46
20	.....	.....	.....	368	250	202	136	107	98	146	136	51
21	.....	.....	.....	314	238	202	136	107	90	116	75	397
22	.....	.....	.....	301	226	214	136	107	82	82	68	90
23	.....	.....	.....	314	250	202	136	107	75	82	68	75
24	.....	.....	.....	1,120	444	202	116	126	68	90	68	68
25	.....	.....	.....	900	354	202	116	116	68	82	62	62
26	.....	.....	.....	623	314	179	116	136	68	68	56	56
27	.....	.....	.....	477	288	202	146	98	68	68	68	56
28	.....	.....	.....	397	238	190	202	107	98	68	107	56
29	.....	.....	.....	340	.....	179	157	107	98	68	82	56
30	.....	.....	.....	301	.....	226	157	107	90	68	75	126
31	.....	.....	.....	301	.....	250	.....	116	.....	68	68	.....
1915–16.												
1	202	98	107	620	385	262	225	155	155	175	262	115
2	136	82	98	528	3,130	562	225	155	145	155	288	155
3	98	82	98	460	1,210	528	275	155	165	155	238	125
4	98	82	98	340	750	430	225	155	155	155	225	115
5	494	82	98	325	562	370	225	145	135	125	238	115
6	262	82	98	385	492	340	225	135	200	115	200	105
7	126	75	98	492	430	385	250	135	225	125	200	95
8	116	68	90	430	385	355	275	135	165	225	225	95
9	98	75	82	400	430	355	250	125	145	620	212	115
10	90	68	82	385	370	355	250	115	145	660	325	95
11	68	68	90	415	340	340	250	115	155	580	275	95
12	68	75	136	385	325	300	238	115	355	460	275	95
13	68	126	136	1,330	400	275	225	115	212	340	250	95
14	75	168	126	750	355	275	212	125	238	300	238	95
15	107	412	126	660	312	275	200	115	750	262	212	85
16	116	226	250	620	300	275	200	115	855	415	200	75
17	90	168	460	492	275	262	212	115	660	415	200	95
18	82	136	3,420	445	275	225	188	105	415	355	165	95
19	116	214	800	400	262	225	175	115	300	430	155	95
20	126	202	428	355	250	225	175	105	262	370	155	95
21	107	179	327	355	250	225	238	95	225	705	155	95
22	340	157	301	660	225	225	188	250	200	510	155	85
23	238	157	250	545	250	212	175	910	188	460	155	75
24	168	157	238	460	312	200	188	800	225	430	135	60
25	146	126	340	415	275	175	175	312	225	400	135	60
26	126	116	327	370	275	262	175	238	188	370	115	60
27	116	146	262	355	250	400	175	188	175	510	115	75
28	107	126	301	325	238	340	175	175	175	492	115	115
29	98	116	4,860	325	275	288	165	188	155	445	115	175
30	98	116	1,330	325	.....	262	155	225	155	325	115	85
31	98	.....	660	325	.....	225	.....	188	.....	288	115	.....

NOTE.—Determinations of discharge, Jan. 1 to Sept. 30, 1915, differ from those published in Water-Supply Paper 403 owing to a revision of the rating curve above 140 second-feet.

Monthly discharge of Valley River at Tomotla, N. C., for the years ending Sept. 30, 1915 and 1916.

[Drainage area, 120 square miles]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1914–15.					
October	830	45	120	1.00	1.15
November	257	65	93.3	.778	.87
December	3,910	148	525	4.38	5.05
January	1,120	226	396	3.30	3.80
February	1,420	226	395	3.29	3.43
March	800	179	272	2.27	2.62
April	327	116	168	1.40	1.56
May	623	98	165	1.38	1.59
June	314	68	105	.875	.98
July	750	68	144	1.20	1.38
August	136	56	73.7	.614	.71
September	397	46	78.2	.652	.73
The year	3,910	45	211	1.76	23.87
1915 16.					
October	494	68	138	1.15	1.33
November	412	68	133	1.11	1.24
December	4,860	82	520	4.33	4.99
January	1,330	325	473	3.94	4.54
February	3,130	225	469	3.91	4.22
March	562	175	304	2.53	2.92
April	275	155	210	1.75	1.95
May	910	95	197	1.64	1.89
June	855	135	258	2.15	2.40
July	705	115	367	3.06	3.53
August	325	115	192	1.60	1.84
September	175	60	97.8	.815	.91
The year	4,860	60	280	2.33	31.76

NOTE.—Monthly discharge record, January to September, 1915, differs from that published in Water Supply Paper 403 owing to a revision of the rating curve above 140 second-feet.

NOTTELY RIVER NEAR RANGER, N. C.

LOCATION.—About half a mile downstream from Ranger, Cherokee County, which is on Louisville & Nashville Railroad, 7½ miles from Murphy, N. C., and 8 miles upstream from Hiwassee River, to which Nottely River is tributary.

DRAINAGE AREA.—272 square miles.

RECORDS AVAILABLE.—February 16, 1901, to December 31, 1905; January 22, 1914, to September 30, 1916.

GAGE.—Rod gage fastened to a large birch tree on left bank 75 feet upstream from highway bridge; zero same as for original gage which was destroyed in 1913, when a new steel bridge replaced old wooden one. Gage read by A. D. Kilpatrick.

DISCHARGE MEASUREMENTS.—Made from downstream side of steel highway bridge on road from Ranger to Murphy, N. C. Measuring section is poor and uneven and current somewhat erratic, necessitating very careful measurements.

CHANNEL AND CONTROL.—Bed composed of boulders, gravel and sand; permanent. Right bank high; left bank subject to overflow beyond bridge end at stages above 18 feet. Control is formed by a low shoal about 300 feet downstream from gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.4 feet at 10 a.m. July 10 (discharge, 6,580 second-feet); minimum stage recorded, 2.6 feet at 6 a. m. October 14 (discharge, 182 second-feet).

1901–1905 and 1914–1916: Maximum discharge, 6,580 second-feet, July 10, 1916; minimum stage recorded, 2.1 feet, July 2 and 3, August 9, September 9 to 11, 14 to 16, 29 and 30, and October 1 to 4, 1914 (discharge, 89 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—The operation of small mills upstream may cause slight diurnal fluctuation, but not enough to affect accuracy of determinations.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined below, but an extension above 800 second-feet. Gage read to tenths twice daily; gage not extended for use above stage 10 feet; determinations of flood stages subject to error as they are obtained by measuring from reference point. Daily discharge ascertained by applying mean daily gage heights to rating table. Records for stages below 800 second-feet, fair; for those above, poor.

Discharge measurements of Nottely River near Ranger, N. C., during the year ending Sept. 30, 1916.

[Made by L. J. Hall.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 18	2.95	248
Jan. 4	4.40	681
Aug. 30	3.78	455
30	3.71	442

Daily discharge, in second-feet, of Nottely River near Ranger, N. C., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,540	310	265	1,230	2,420	721	465	359	410	3[illegible]0	653	465
2	862	265	265	1,230	3,780	862	437	334	410	524	862	410
3	265	265	265	790	1,940	790	410	334	410	465	755	410
4	265	265	265	687	1,230	755	721	334	359	359	721	410
5	2,420	265	244	687	1,040	721	524	334	359	334	687	384
6	1,230	244	244	587	862	721	524	334	359	334	620	384
7	1,160	234	234	687	790	653	494	334	359	334	587	359
8	524	223	234	620	790	653	465	334	359	1,230	790	359
9	410	223	223	524	755	620	465	334	359	3,380	653	410
10	265	212	223	524	721	587	437	310	359	6,580	862	384
11	244	212	234	524	687	555	437	310	653	4,980	721	359
12	234	202	494	524	653	524	437	310	826	2,980	587	359
13	223	202	384	1,230	620	494	410	287	721	2,020	524	334
14	182	524	265	862	587	653	410	384	721	2,420	1,120	334
15	524	437	265	653	555	524	410	310	1,620	1,940	653	334
16	359	384	244	687	524	494	410	287	1,230	1,160	653	310
17	265	359	234	620	524	465	410	287	862	1,010	587	310
18	265	334	4,580	587	524	437	410	265	653	1,230	587	287
19	265	265	1,740	524	494	437	410	265	524	1,010	555	287
20	1,980	359	1,230	524	494	437	384	265	524	1,230	524	265
21	524	334	1,160	494	465	437	384	265	494	1,080	494	265
22	465	310	1,230	687	465	437	359	265	1,080	1,230	465	265
23	465	310	524	1,190	437	437	359	1,080	524	1,080	465	265
24	410	287	465	1,010	410	410	334	862	437	971	437	265
25	384	287	437	862	384	410	334	1,500	384	988	410	265
26	359	265	359	790	359	410	384	1,230	1,080	862	410	265
27	359	265	334	687	310	653	359	790	524	862	359	244
28	384	265	265	620	310	587	359	524	410	826	359	244
29	384	265	4,580	587	587	524	359	465	721	790	359	1,620
30	359	265	2,420	555	.....	465	359	410	465	721	524	465
31	334	.....	2,300	524	.....	465	.....	410	.....	687	359	.....

Monthly discharge of Nottely River near Ranger, N. C., for the year ending Sept. 30, 1916.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	2,420	182	578	2.12	2.44
November	524	202	288	1.06	1.18
December	4,580	223	845	3.11	3.58
January	1,230	494	720	2.65	3.06
February	3,780	310	818	3.01	3.25
March	862	410	559	2.06	2.38
April	721	334	422	1.55	1.73
May	1,500	265	455	1.67	1.92
June	1,620	359	607	2.23	2.49
July	6,580	334	1,420	5.22	6.02
August	1,120	359	592	2.18	2.51
September	1,620	244	377	1.39	1.55
The year	6,580	182	641	2.36	32.11

TOCCOA RIVER NEAR DIAL, GA.

LOCATION.—About 2,600 feet above Shallow Ford, 1 mile above Rock Creek, 2½ miles below Big Creek, 3½ miles below Noontootley Creek, about 4 miles northwest of Dial, Fannin County, and about 12 miles by river above gaging station at Morganton.

DRAINAGE AREA.—175 square miles (determined by Tennessee Power Company).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1916.

GAGE.—Bristol water-gage recorder. Sea-level elevation of zero of auxiliary staff gage, 1,781.13 feet.

DISCHARGE MEASUREMENTS.—Made from cable about 1,000 feet upstream from gage.

CHANNEL AND CONTROL.—Bed of stream consists of gravel and boulders; fairly smooth. Left bank is overflowed at a stage of about 12 feet. Control is formed by the head of rapids just below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.0 feet at 6 p. m. July 9 (discharge, 9,200 second-feet); minimum stage, daily mean, 1.1 feet December 3 (discharge, 225 second-feet).

1913–1916: Maximum stage recorded, 10.0 feet at 6 p. m. July 9, 1916 (discharge, 9,200 second-feet); minimum stage, 0.55 foot October 13, 29, and 30, 1914 (discharge, 109 second-feet).

DIVERSIONS.—None.

REGULATION.—There are slight diurnal fluctuations due to operation of small mills upstream.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 4,000 second-feet; extended above 4,000 second-feet. Stage-discharge relation never affected by ice. Daily discharge ascertained by applying to the rating table mean daily gage heights determined by inspecting gage-height graph. Records excellent.

Discharge measurements of Toccoa River near Dial, Ga., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	L. J. Hall	1.44	336	July 12	L. J. Hall	5.56	3,600
Jan. 1	do	2.70	1,000	12	do	5.20	3,210
26	do	2.17	689	Aug. 3	do	2.46	868
Mar. 4	do	2.26	709	25	Warren E. Hall and L. J. Hall	1.74	468
Apr. 12	do	1.72	453				
May 2	do	1.50	341	Sept. 2	L. J. Hall	1.60	411
31	do	1.85	495				

Daily discharge, in second-feet, of Toccoa River at Dial, Ga., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,000	284	260	1,000	1,840	662	478	370	432	455	815	410
2	370	284	253	905	2,200	905	478	370	410	410	845	410
3	260	264	225	815	1,420	875	522	370	410	390	845	410
4	684	256	260	733	1,130	728	500	370	390	390	755	410
5	1,340	253	260	600	1,000	672	478	350	390	410	755	410
6	522	260	260	755	935	645	478	330	595	370	905	410
7	424	260	256	706	851	755	522	350	570	432	815	410
8	350	260	256	656	845	700	570	330	432	1,750	700	455
9	298	260	253	620	875	645	500	330	390	6,730	728	432
10	284	253	236	615	785	620	478	312	390	6,990	672	410
11	267	242	295	662	700	595	478	312	522	5,300	645	370
12	256	256	350	645	755	570	455	312	595	3,220	595	370
13	253	302	295	827	672	570	455	312	478	2,600	645	350
14	410	350	270	728	595	545	455	295	522	2,110	620	410
15	432	500	270	672	620	570	432	295	1,880	1,620	590	390
16	330	323	302	728	595	545	432	295	1,030	1,840	570	350
17	312	298	1,100	645	595	522	478	295	755	1,580	545	330
18	295	330	3,660	595	570	522	410	295	620	1,700	595	330
19	935	565	1,270	570	605	500	410	312	570	1,840	545	350
20	845	394	845	555	605	500	410	278	545	1,580	518	330
21	645	358	700	570	590	500	500	278	522	1,420	500	312
22	575	330	620	1,000	565	500	432	815	522	1,240	478	312
23	455	312	570	815	625	478	410	1,840	478	1,270	500	312
24	390	295	545	716	755	455	410	1,200	620	1,380	491	295
25	370	278	672	672	610	455	410	700	570	1,300	464	295
26	354	295	595	672	595	570	410	570	482	1,160	455	278
27	334	295	545	656	585	785	410	500	446	1,060	432	278
28	326	278	728	595	595	595	390	500	450	968	432	278
29	312	260	5,430	620	620	545	370	545	545	935	478	545
30	295	260	1,840	595	.....	500	390	595	455	905	500	312
31	264	.....	1,200	733	.....	500	.....	522	.....	845	432	.....

Monthly discharge of Toccoa River, near Dial, Ga., for the year ending Sept. 30, 1916.

[Drainage area, 175 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,340	253	458	2.62	3.02
November	565	242	305	1.74	1.94
December	5,430	225	794	4.54	5.23
January	1,000	555	699	3.99	4.60
February	2,200	565	817	4.67	5.04
March	905	455	598	3.42	3.94
April	570	370	452	2.58	2.88
May	1,840	278	469	2.68	3.09
June	1,880	390	567	3.24	3.62
July	6,990	370	1,750	10.00	11.53
August	905	432	609	3.48	4.01
September	545	278	365	2.09	2.33
The year	6,990	225	659	3.77	51.23

TOCCOA RIVER NEAR MORGANTON, GA.

LOCATION.—At Morganton highway bridge on road from Blueridge, Ga., to Morganton, half a mile downstream from mouth of Star Creek, 2 miles west of Morganton Post Office, Fannin County, 4 miles east of Blueridge, 7 miles downstream from Dial gaging station, 14 miles upstream from Georgia-Tennessee State line at Copperhill, Tenn., and 28 miles upstream from gaging station on Ocoee River at Emf, Tenn. At State line name of river is changed from Toccoa to Ocoee.

DRAINAGE AREA.—231 square miles (determined by Tennessee Power Company).

RECORDS AVAILABLE.—November 25, 1898, to March 31, 1903, and April 1, 1913, to September 30, 1916. Records 1898 to 1903 published in Water Supply Paper 197, under "Toccoa River near Blueridge, Ga."

GAGE.—Bristol automatic water-stage recorder on right bank 200 feet downstream from bridge and 150 feet downstream from the old vertical staff which was used from 1898 to 1903, zeros of both gages, 1,544.5 feet above sea level, but on account of the slope in water surface the readings of the two gages do not agree for all stages. The water-stage recorder was installed in 1914 (exact date not recorded). A rod gage has been placed at site of automatic gage. Observer visits gage every day and checks record sheet with rod reading.

DISCHARGE MEASUREMENTS.—Made from cable about 1,800 feet downstream from gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Banks high; left subject overflow at about gage height 15 feet; right bank not subject to overflow. Low-water control by a low shoal or riffle just below gage; high-water control by combination of shoals and banks. Control subject to small shifts at low stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.0 feet at 9 p. m. July 9 (discharge, 13,900 second-feet); minimum stage, mean from water-stage recorder, 2.50 feet December 9 and 10 (discharge, 254 second-feet).

1913–1916: Maximum stage recorded, 13.0 feet at 9 p. m. July 9, 1916 (discharged, 13,900 second-feet); minimum stage, 1.8 feet September 10, 14 to 17, 29, 30, and October 1, 1914 (discharge, 129 second-feet).

DIVERSIONS.—None.

REGULATION.—Slight diurnal fluctuations probably caused by operation of small mills upstream.

ACCURACY.—Stage-discharge relation for lower part of curve changed during high water in May, 1916. Rating curve used prior to May 22 well defined below 3,500 second-feet and an extension above that point; curve used subsequent to May 22 is well defined below 3,500 second-feet, and coincides with previous curve above 870 second-feet; change below 870 second-feet due to slight shift in low-water control. Stage-discharge relation not affected by ice. Daily discharge ascertained by applying to the rating table mean daily gage heights obtained by inspecting gage-height graph. Records excellent.

Discharge measurements of Toccoa River near Morganton, Ga., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 30	L. J. Hall	2.72	332	June 1	L. J. Hall	3.06	540
Dec. 10	do	2.58	281	July 5	do	3.08	527
30	do	4.97	1,940	6	do	2.91	447
31	do	4.28	1,440	13	do	5.60	2,750
Jan. 3	do	3.75	989	29	do	3.87	1,060
25	do	3.53	779	Aug. 1	do	3.70	928
Feb. 1	do	5.60	2,450	4	do	3.60	892
2	do	6.30	3,230	26	Warren E. Hall and L. J. Hall	3.06	523
2	do	5.92	2,750	31	L. J. Hall	3.00	484
Mar. 2	do	4.05	1,170	Sept. 30	do	2.75	374
May 4	do	2.95	473				

Daily discharge, in second-feet, of Toccoa River near Morganton, Ga., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,260	331	290	1,180	2,220	798	570	429	518	575	870	465
2	456	331	290	1,100	2,640	1,180	570	429	490	545	908	490
3	319	310	290	960	1,820	1,180	632	429	465	490	945	465
4	404	306	290	848	1,420	908	600	429	465	465	835	450
5	1,580	298	286	805	1,260	834	540	429	465	518	800	440
6	600	298	283	885	1,180	798	570	404	575	465	1,020	431
7	456	294	261	820	1,110	945	570	404	665	518	908	422
8	378	290	261	784	1,020	834	696	404	490	3,490	800	426
9	323	290	254	764	1,060	729	632	404	465	11,600	800	490
10	302	290	254	757	1,010	729	600	404	465	12,000	800	465
11	290	290	331	750	922	729	570	378	635	11,000	698	418
12	283	290	429	743	908	663	540	378	765	7,170	665	395
13	272	331	354	1,100	885	663	540	378	635	2,550	678	375
14	404	414	310	870	812	663	512	378	605	2,060	698	465
15	570	600	310	764	784	663	512	354	2,060	1,820	653	440
16	388	404	378	812	784	632	540	354	1,220	1,820	605	375
17	364	354	1,420	798	764	600	570	354	908	1,740	599	375
18	340	354	2,840	743	764	600	483	331	765	1,660	593	375
19	870	663	1,500	743	709	600	483	354	665	1,940	605	375
20	998	483	1,020	750	696	600	600	331	605	1,740	545	355
21	784	429	798	736	696	600	512	331	605	1,500	540	355
22	657	378	764	1,180	663	600	483	945	605	1,340	496	355
23	534	354	663	1,020	696	540	483	2,300	545	1,380	528	355
24	478	354	600	834	945	540	483	1,500	710	1,460	501	338
25	429	331	729	798	764	540	456	835	744	1,420	512	338
26	404	345	663	798	689	663	483	665	581	1,300	518	320
27	378	378	600	798	663	945	483	575	534	1,180	490	320
28	378	331	1,020	764	676	729	456	518	534	1,140	465	338
29	364	331	7,650	750	863	663	456	635	623	1,020	465	765
30	345	290	1,980	729	.....	600	456	730	605	982	635	355
31	331	.....	1,420	870	.....	600	.....	605	.....	945	490	.....

Monthly discharge of Toccoa River near Morganton, Ga., for the year ending Sept. 30, 1916.

[Drainage area, 231 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,580	272	514	2.23	2.57
November	663	290	358	1.55	1.73
December	7,650	254	921	3.99	4.60
January	1,180	729	847	3.67	4.23
February	2,640	663	1,010	4.37	4.71
March	1,180	540	722	3.13	3.61
April	696	456	536	2.32	2.59
May	2,300	331	561	2.43	2.80
June	2,060	465	667	2.89	3.22
July	12,000	465	2,510	10.9	12.57
August	1,020	465	667	2.89	3.33
September	765	320	411	1.78	1.99
The year	12,000	254	813	3.52	47.95

OCOEE RIVER AT EMF, TENN.

LOCATION.—About 600 feet below Tennessee Power Co.'s plant No. 2, known as the "Caney Creek plant," half a mile upstream from Emf post office, Polk County, 1½ miles downstream from mouth of Goforth Creek, and 8 miles upstream from Parksville, Tenn.

DRAINAGE AREA.—530 square miles (determined by Tennessee Power Co.).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1916.

GAGE.—Bristol water-stage recorder on left bank; checked daily with a staff gage which is bolted to rock near the Bristol. Readings from gage give elevation above sea-level.

DISCHARGE MEASUREMENTS.—Made from cable at first good section one-half mile downstream from gage, near Emf post office.

CHANNEL AND CONTROL.—Bed of stream for several hundred feet below gage is composed of boulders, gravel and solid rock. Banks high, subject to small overflow. Control is formed by a shoal and island 700 feet downstream from gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.7 feet at 12.30 a. m. July 10 (discharge, 21,400 second-feet); minimum stage, mean for day, from water-stage recorder, 3.17 feet on November 11 (discharge, 514 second-feet).

1913–1916: Maximum stage recorded, 13.7 feet at 12.30 a. m. July 10, 1916 (discharge, 21,400 second-feet); minimum stage, 2.77 feet September 15 to 17, 1914 (discharge, 285 second-feet).

DIVERSIONS.—None.

REGULATION.—The operation of plant No. 2 causes considerable fluctuation at times, but as a rule, this plant runs on a steady load, the quantity of water used depending largely on stage of river. Storage at diversion dam very small. When plant is shut down water overflows dam in a short time, so that periods of fluctuation will be short.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve well defined between 250 and 6,000 second-feet; above 6,000 second-feet curve is extended as a tangent. During periods in which recorder was not working properly stage was determined by numerous rod readings daily by operators of hydroelectric plant. Daily discharge ascertained by applying to rating table mean daily gage heights determined by inspecting gage-height graph. Records excellent.

Discharge measurements of Ocoee River at Emf, Tenn., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 8	L. J. Hall	4.46	1,250	June 29	L. J. Hall	3.68	982
Feb. 6	do	4.75	2,080	July 15	do	5.22	3,000
May 12	Warren E. Hall and L. J. Hall	3.47	747	Aug. 9	do	4.14	1,460

Daily discharge, in second-feet, of Ocoee River at Emf, Tenn., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,730	576	597	2,300	4,220	1,470	1,000	808	980	850	1,490	765
2	1,220	597	642	2,140	6,630	2,550	922	824	904	980	1,660	833
3	698	583	635	1,930	4,220	2,300	1,060	824	859	931	1,640	824
4	2,140	554	604	1,680	2,730	1,800	1,080	842	850	774	1,600	740
5	4,110	561	597	1,470	2,140	1,550	980	833	790	790	1,730	706
6	1,550	540	604	1,600	2,140	1,430	1,010	842	886	765	1,490	715
7	1,000	533	583	1,750	2,000	1,570	980	799	1,250	782	1,760	668
8	808	533	583	1,760	1,860	1,620	1,240	799	922	1,640	1,640	740
9	698	533	554	1,440	1,790	1,420	1,150	765	808	10,400	1,470	904
10	635	547	526	1,420	1,800	1,380	1,030	740	765	14,300	1,460	757
11	597	514	627	1,470	1,630	1,340	1,010	740	1,090	13,200	1,340	689
12	561	520	877	1,440	1,550	1,280	1,030	731	1,600	8,170	1,210	642
13	533	590	765	2,300	1,550	1,200	1,000	748	1,190	4,950	1,190	635
14	561	731	666	1,930	1,570	1,180	1,000	774	1,500	3,900	1,190	673
15	960	1,760	658	1,660	1,400	1,220	990	689	5,580	3,200	1,210	895
16	782	1,100	1,130	1,550	1,430	1,190	913	698	2,380	2,820	1,100	673
17	666	774	2,380	1,630	1,380	1,100	980	706	1,860	2,730	990	619
18	635	740	12,400	1,410	1,320	1,070	886	681	1,420	3,200	1,010	612
19	723	1,130	3,500	1,300	1,290	1,020	859	689	1,250	3,400	990	612
20	1,640	1,110	1,930	1,280	1,260	1,040	842	689	1,070	3,110	1,040	604
21	1,210	877	1,520	1,230	1,220	1,020	1,010	673	1,050	2,380	1,370	604
22	1,360	757	1,370	3,020	1,180	970	859	2,000	1,000	2,140	960	576
23	1,320	706	1,730	2,550	1,200	1,000	850	3,400	1,030	2,000	990	590
24	990	666	1,090	1,790	1,860	950	990	5,480	1,030	2,460	990	568
25	859	635	3,500	1,580	1,560	940	868	1,600	1,290	2,460	922	568
26	782	774	1,550	1,500	1,340	950	877	1,250	1,060	2,070	868	533
27	740	1,120	1,170	1,430	1,290	1,430	895	1,090	931	2,140	816	533
28	689	765	1,290	1,410	1,240	1,300	877	980	895	1,800	824	619
29	666	673	13,200	1,340	1,480	1,170	877	1,060	980	1,600	799	1,000
30	635	635	4,950	1,300	.....	1,060	824	1,250	1,010	1,500	895	681
31	612	.....	2,920	1,420	.....	1,010	.....	1,250	.....	1,460	833	.....

Monthly discharge of Ocoee River at Emf, Tenn., for the year ending Sept. 30, 1916.

[Drainage area, 530 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	4,110	533	1,070	2.02	2.33
November	1,760	514	738	1.39	1.55
December	13,200	526	2,100	3.96	4.56
January	3,020	1,230	1,680	3.17	3.66
February	6,630	1,180	1,940	3.66	3.95
March	2,550	940	1,310	2.47	2.85
April	1,240	824	963	1.82	2.03
May	5,480	673	1,140	2.15	2.48
June	5,580	765	1,270	2.40	2.68
July	14,300	765	3,320	6.26	7.22
August	1,760	799	1,210	2.28	2.63
September	1,000	533	686	1.29	1.44
The year	14,300	514	1,460	2.75	37.38

OCOEE RIVER AT PARKSVILLE, TENN.

LOCATION.—About 1,500 feet downstream from dam and power plant No. 1 of the Tennessee Power Co. at Parksville, Polk County, 6 miles east of Ocoee station on main line of Louisville & Nashville Railroad, 10 miles upstream from junction of Ocoee River with Hiwassee River, and 16 miles east of Cleveland, Tenn.

DRAINAGE AREA.—600 square miles (measured by Tennessee Power Co.).

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1916.

GAGE.—Bristol water-stage recorder 1,500 feet downstream from dam; gage diaphragm in a concrete-lined stilling well 50 feet from right edge of river; recorder is referred to a rod gage in well.

DISCHARGE MEASUREMENTS.—Made from cable just below gage or by wading at a section 800 feet downstream.

CHANNEL AND CONTROL.—Bed of stream composed of rock for several hundred feet above and below gage. Both banks high but left bank is overflowed at extremely high stages. Control formed by a rock and gravel riffle and two islands 800 feet downstream; control for low and medium stages probably permanent; for high stages may be variable as the islands are made chiefly of sand.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 15.75 feet at 3 a. m. July 10 (discharge, 17,000 second-feet); minimum stage, mean for day, 2.11 feet November 7 (discharge, 93 second-feet).

1911–1916: Maximum stage recorded, 15.75 feet at 3 a. m. July 10, 1916 (discharge, 17,000 second-feet); minimum stage, mean for day, 1.87 feet January 31, 1914 (discharge, 30 second-feet).

DIVERSIONS.—None.

REGULATION.—Very great diurnal fluctuation caused by operation of power plant at No. 1.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve well defined between 60 and 8,000 second-feet. Daily discharge ascertained by applying to rating table mean daily gage heights obtained by inspecting gage-height graph. Except for errors due to use of this method and great diurnal fluctuation of stage, records are excellent.

Discharge measurements of Ocoee River at Parksville, Tenn., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 8	L. J. Hall	5.32	2,000	May 11	Warren E. Hall and L. J. Hall	4.76	1,380
8	do	5.75	2,450	June 27	do	5.28	1,690
Dec. 6	do	4.12	1,050	28	L. J. Hall	4.18	1,190
Jan. 7	do	6.26	3,030	July 16	do	6.06	2,760
Feb. 5	do	6.12	2,810	Aug. 8	do	5.56	2,280

Daily discharge, in second-feet, of Ocoee River at Parksville, Tenn., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	159	795	716	3,020	1,940	1,860	1,100	1,300	1,530	768	1,990	875
2	106	575	850	2,220	3,380	1,940	1,030	1,300	1,610	795	2,040	850
3	740	565	795	2,740	5,180	2,740	1,060	1,340	1,300	696	2,040	878
4	1,030	685	468	2,620	3,380	2,270	1,530	1,130	1,160	1,200	2,120	791
5	3,880	716	468	2,520	2,840	1,690	1,300	1,610	1,200	1,240	1,990	966
6	2,220	635	565	2,220	1,650	2,370	1,270	1,340	1,160	1,130	1,730	850
7	1,570	93	716	2,370	2,620	1,990	1,380	575	1,300	1,060	2,080	1,100
8	1,340	742	640	1,990	2,420	2,170	1,160	1,240	878	382	1,990	966
9	1,490	936	665	1,240	2,270	1,940	1,060	1,300	615	1,730	2,270	665
10	615	795	665	2,040	2,170	1,650	1,490	1,650	850	11,200	2,170	269
11	1,270	997	752	1,940	1,990	1,610	1,450	878	665	8,300	2,170	997
12	1,030	850	944	1,990	1,650	1,030	1,270	615	2,080	6,980	1,810	1,100
13	822	590	822	2,420	1,060	1,650	1,160	850	1,900	5,180	1,380	878
14	997	123	697	2,080	1,770	1,570	1,130	630	1,860	4,660	2,040	1,240
15	610	327	516	2,080	1,900	1,690	1,200	1,450	2,790	4,140	1,990	1,170
16	822	822	373	1,060	2,080	1,490	545	1,130	3,200	3,750	1,900	735
17	555	997	878	2,370	1,570	1,340	1,200	1,200	2,790	3,880	1,340	190
18	1,060	1,270	7,700	2,270	1,730	1,270	1,160	1,340	1,810	2,620	1,300	907
19	997	1,300	7,550	2,170	1,810	645	1,270	1,410	2,270	1,610	716	768
20	936	1,030	5,050	2,570	1,100	1,490	1,300	1,240	2,320	2,420	966	936
21	630	487	3,200	2,170	1,570	997	1,730	565	2,040	1,900	1,300	742
22	645	1,160	2,080	2,220	1,300	907	1,450	373	1,940	1,690	1,300	768
23	742	936	1,490	1,690	1,530	1,450	795	565	1,690	1,160	1,270	660
24	575	1,240	795	2,320	1,650	1,240	1,490	373	1,380	2,620	1,300	608
25	1,270	768	850	2,570	1,650	1,060	1,690	318	878	3,140	878	693
26	1,530	1,570	1,730	2,420	1,770	822	1,810	309	1,570	1,900	1,810	611
27	1,770	685	1,200	1,940	907	1,300	1,730	159	1,380	2,420	1,240	615
28	1,240	742	1,410	1,900	1,450	1,570	1,610	248	936	1,770	1,240	707
29	936	936	17,000	1,770	1,860	1,500	1,240	878	822	2,270	1,100	1,060
30	665	1,060	9,500	742	.....	1,340	345	966	716	1,810	822	719
31	615	.....	4,920	1,200	.....	1,340	.....	1,270	.....	2,080	966	.....

NOTE.—No gage heights Oct. 3, Dec. 11, 12, 14, 29 and 30, Mar. 29, Sept. 1–4, 15, 16, 23–30; discharge determined from record at gage No. 2 (power-house operation, Tennessee Power Co.).

Monthly discharge of Ocoee River at Parksville, Tenn., for the year ending Sept. 30, 1916.

[Drainage area, 600 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	3,880	106	1,060	1.77	2.04
November	1,570	93	814	1.36	1.52
December	17,000	373	2,450	4.08	4.70
January	3,020	742	2,090	3.48	4.01
February	5,180	907	2,010	3.35	3.61
March	2,740	645	1,550	2.58	2.97
April	1,810	345	1,270	2.12	2.36
May	1,650	159	953	1.59	1.83
June	3,200	615	1,550	2.58	2.88
July	11,200	382	2,790	4.65	5.36
August	2,270	716	1,590	2.65	3.06
September	1,240	190	810	1.35	1.51
The year	17,000	93	1,580	2.63	35.85

BIG BEAR RIVER NEAR RED BAY, ALA.

LOCATION.—At Norman Bridge, 2½ miles east of Red Bay, Franklin County, 3 miles east of Mississippi State line, 4 miles downstream from mouth of Blue Creek and 35 miles above junction with Tennessee River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24, 1913, to September 30, 1916.

GAGE.—Vertical staff attached to a sweet-gum tree on left bank, 25 feet upstream from bridge; read once daily, to tenths, by Ed Bullen.

CHANNEL AND CONTROL.—Bed of river consists of gravel; probably shifting. During extremely low water current is sluggish and irregular. Left bank subject to overflow at stages above about 12 feet. Control is a gravel bar 100 feet downstream; probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 14.2 feet at 7 p. m. July 9; minimum stage recorded, 1.0 foot at 7 a. m. November 9 to 11, September 7 to 9, 14 to 23, and 28 to 30.

1913–1916: Maximum stage recorded, 14.2 feet at 7 p. m. July 9, 1916; minimum stage recorded, 0.5 foot at 7 a. m. July 8 and 9 and September 18, 1913.

ICE.—Stage-discharge relation not affected by ice.

COOPERATION.—Gage readings furnished by the Geological Survey of Alabama.

Data inadequate for determination of discharge.

Daily gage height, in feet, of Big Bear River near Red Bay, Ala., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.4	1.3	2.8	7.8	5.7	4.6	2.8	1.8	2.4	1.1	2.0	1.2
2	10 6	1.3	2 5	7.5	5.3	4.8	2.7	1.8	1.7	3.0	1.9	1.1
3	3.7	1.2	2 3	8.2	4.5	5.4	4.5	1.9	1.5	1.7	1.9	1.1
4	2.7	1.2	2.1	7.1	3.9	4.4	7.0	2.5	1.4	2.3	2.4	1.1
5	5.0	1.1	2.0	5.6	3.6	3.7	5.1	2.8	1.4	3.5	4.1	1.1
6	5.3	1.1	2.0	4.7	3.4	3.5	4.2	2.3	1.3	2.0	2.5	1.1
7	3.5	1.1	1.9	4.1	3.5	3.5	3.7	2.0	2.8	6.0	2.1	1.0
8	2.6	1.1	1.9	3.7	3.3	3.4	5.2	1.9	2.3	13.9	2.3	1.0
9	2.1	1.0	1.9	3.2	3.1	3.0	5.9	1.8	1.9	14.2	4.9	1.0
10	1.9	1.0	1.8	3.0	6.0	2.8	4.6	1.7	1.6	13.8	3.3	1.1
11	1.8	1.0	1.8	2.9	5.1	2.6	4.0	1.6	1.4	12.0	2.8	1.3
12	1.7	1.1	1.7	2.8	4.4	2.4	3.5	1.5	1.4	12.9	2.4	1.2
13	1.6	1.6	1.9	4.6	4.0	2.3	3.1	1.5	1.3	11.8	2.1	1.1
14	1.6	1.6	1.8	6.0	3.6	2.3	2.8	1.4	1.3	10.9	2.5	1
15	1.7	3.9	1.7	4.8	3.3	2.4	2.6	1.4	2.4	10.6	2.2	1.0
16	1.7	7.0	1.7	3.9	3.1	2.3	2.4	1.5	1.9	10.4	2.0	1.0
17	1.6	3.8	1.9	3.6	3.0	2.2	2.3	2.8	2.4	7.3	1.8	1.0
18	1.5	2.9	5.6	3.4	2.9	2.1	2.2	2.5	1.8	7.9	1.6	1.0
19	1.4	6.1	8.9	3.1	2.8	2.1	2.1	2.0	1.5	6.7	1.5	1.0
20	6.0	6.7	5.6	3.0	2.6	2.0	2.1	1.8	1.4	8.0	1.5	1.0
21	3.7	4.2	4.1	3.0	2.5	2.0	2.9	1.7	1.3	5.2	1.7	1.0
22	2.6	3.1	3.2	6.1	2.4	1.9	3.8	1.8	1.2	4.9	1.6	1.0
23	2.1	2.8	3.0	13.2	2.4	1.9	2.7	3.4	1.2	4.2	1.5	1.0
24	1.8	2.5	2.8	11.1	2.7	1.8	2.4	2.7	2.3	3.5	1.5	1.3
25	1.7	2.3	4.0	6.8	2.6	1.8	2.2	2.4	3.1	3.0	1.6	1.2
26	1.6	2.4	7.4	5.3	2.4	4.6	2.1	2.0	1.6	2.7	1.5	1.1
27	1.5	6.4	5.3	4.7	2.3	7.7	2.0	1.8	1.4	2.5	1.4	1.1
28	1.5	5.5	4.4	5.3	2.2	5.1	2.0	1.7	1.3	2.3	1.4	1.0
29	1.4	4.2	10.4	5.0	3.2	4.0	1.9	1.6	1.2	2.2	1.3	1.0
30	1.4	3.1	13.2	4.4	.....	3.4	1.9	1.6	1.1	2.4	1.2	1.0
31	1.4	.....	10.0	3.9	.....	3.0	.....	2.5	.....	2.2	1.2	.....

MISCELLANEOUS MEASUREMENTS.

The results of measurements of flow of streams in the Ohio River basin at points other than regular gaging stations are presented in the following table:

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1915.				*Feet.*	*Sec.-ft.*
Nov. 10	Collins River	Caney Fork	Rock Island, Tenn.	[a] 1.72	340
12	do	do	do	[a] 1.76	359
13	do	do	do	[a] 2.55	956
13	do	do	do	[a] 2.89	1,260
22	do	do	do	[a] 3.31	2,810
23	do	do	do	[a] 3.58	2,250
1916.					
Feb. 24	do	do	do	[b] 2.08	1,150
Sept. 13	do	do	do	[b] .57	231
19	do	do	do	[b] .86	292
21	do	do	do	[b] .72	284
Feb. 24	Caney Fork	Cumberland River	do	[c] 2.09	1,300
May 19	do	do	do	[c] .95	392
Sept. 13	do	do	do	[c] .57	215
19	do	do	do	[c] .85	377
21	do	do	do	[c] .71	271

[a] This series of measurements made about 1½ miles upstream from mouth of river and referred to a rod gage. The gage was intended as a regular station but a natural diversion shunted part of water past gage. These measurements therefore do not show flow except at gage, which was close to the present tunnel inlet of Tennessee Power Co.'s plant.

[b] This series of measurements made from wagon bridge close to mouth of river. Gage heights are from gage on Caney Fork below mouth of Collins River.

[c] These measurements made from a cable foot-bridge just above mouth of Collins River. Gage heights are from a gage on Caney Fork about 600 feet below mouth of Collins River. Backwater from a dam under construction on Caney Fork near the gage affected both Collins and Caney Fork (upper) after March, 1916.

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STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART III.—OHIO RIVER BASIN

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.
Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Austin, Tex., Old Post Office Building.
Helena, Mont., Montana National Bank Building.
Boise, Idaho, 615 Idaho Building.
Topeka, Kans., 25 Federal Building.
Denver, Colo., 403 New Post Office Building.
Phoenix, Ariz., 417 Fleming Building.
Salt Lake City, Utah, 421 Federal Building.
Tacoma, Wash., 406 Federal Building.
Portland, Oreg., 416 Couch Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 4,100 points in the United States, and the data obtained have been published in the reports tabulated below.

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, ground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the monographs, bulletins, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three parts:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will, on application, furnish lists giving prices.

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Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; W=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30., 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31., 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31., 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.
W 431 to 444	do	1916.

NOTE.—No stream-flow data are given the 15th and 17th annual reports.

The records at the most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The following table gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1916. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data from 1902 to 1916 for any station in the area covered by Part III are published in Water-Supply Papers 83, 98, 128, 169, 205, 243, 263, 283, 303, 323, 353, 383, 403, and 433 which contain records for the Ohio River basin for those years.

Numbers of water-supply papers containing results of stream measurements, 1899–1916.

Year.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												North Pacific slope basins.		
	North Atlantic slope basins. (St. John River to York River).	South Atlantic and eastern Gulf of Mexico basins. (James River to the Mississippi).	Ohio River basin.	St. Lawrence River basin.	Hudson Bay and upper Mississippi River basins.	Missouri River basin.	Lower Mississippi River basin.	Western Gulf of Mexico basins.	Colorado River basin.	Great Basin.	Pacific slope basins in California.	Pacific slope basins in Washington and upper Columbia River basin.	Snake River basin.	Lower Columbia River basin and Pacific slope basins in Oregon.
1899[a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900[g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [a] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	212
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kerns rivers and south Pacific coast basin.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California, except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area: That is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page III, and the records for large lakes taken up are in order of streams around the rim of the lake.

PART III. OHIO RIVER BASIN.

PRINCIPAL STREAMS.

The Ohio River basin includes Ohio River with all its tributaries, the most important being Allegheny, Monongahela, Beaver, Muskingum, New (or Kanawha), Scioto, Miami, Kentucky, Wabash, Cumberland, and Tennessee rivers. The streams drain parts of the States of Alabama, Georgia, Illinois, Indiana, Kentucky, Mississippi, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the Ohio River basin, the following pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See pp. xx–xxi.)

GAGING STATIONS.

NOTE.—Dash following a date indicates that the station was being maintained September 30, 1916. Period after date indicates discontinuance.

Allegheny River (head of Ohio River) at Red House, N. Y., 1903–
Allegheny River at Kittanning, Pa., 1904–1913.
Ohio River at Wheeling, W. Va., 1905–6.
Conewango Creek:
Chadakoin River (Chatauqua Lake outlet) near Jamestown, N. Y., 1904–5.
Kiskiminitas River at Avonmore, Pa., 1907–1913.
Kiskiminitas River at Salina, Pa., 1904–1905.
Blacklick Creek at Blacklick, Pa., 1904–1906; 1907–1913.
Tygart River near Dailey, W. Va., 1915–
Tygart River (head of Monongahela River) at Belington, W. Va., 1907–
Tygart River at Fetterman, W. Va., 1907–
Monongahela River at Lock 15, Hoult, W. Va., 1915–
Monongahela River at Morgantown, W. Va., 1914–1915.
Monongahela River at Lock No. 4, Pa., 1886–1905. Flood-stage record only.
Middle Fork River at Midvale, W. Va., 1915–
Buckhannon River at Hall, W. Va., 1907–1909; 1915–
West Fork River at Butcherville, W. Va., 1915–
West Fork River at Enterprise, W. Va., 1907–
Elk Creek near Clarksburg, W. Va., 1910–
Buffalo Creek at Barrackville, W. Va., 1907–8; 1915–
Deckers Creek at Morgantown, W. Va., 1914–15.
Cheat River near Parsons, W. Va., 1913–
Cheat River at Rowlesburg, W. Va., 1914–
Cheat River near Morgantown, W. Va., 1899–1900; 1902–1905, 1913–
Blackwater River at Hendricks, W. Va., 1914–
Shavers Fork at Parsons, W. Va., 1910–
Big Sandy Creek at Rockville, W. Va., 1909–

Ohio River tributaries—Continued.
Monongahela River tributaries—Continued.
Youghiogheny River at Friendsville, Md., 1898–1904.
Youghiogheny River at Confluence, Pa., 1904–1913.
Casselman River at Markleton, Pa., 1913.
Casselman River at Confluence, Pa., 1904–1913.
Laurel Hill Creek at Ursina, Pa., 1913.
Laurel Hill Creek at Confluence, Pa., 1904–1913.
Indian Creek in Westmoreland County, Pa., 1892–3.
Beaver River at Wampum, Pa., 1914.
Mahoning River at Youngstown, Ohio, 1903–1906.
Conoquenessing Creek near Ellwood, Pa., 1914.
Little Beaver Creek near East Liverpool, Ohio, 1915–
Yellow Creek at Hammondsville, Ohio, 1915–
Cross Creek near Mingo Junction, Ohio, 1903.
McMahon River at Steel, Ohio, 1903.
Middle Island Creek at Little, W. Va., 1915–
Little Muskingum River at Fay, Ohio, 1915–
Muskingum River at Zanesville, Ohio, 1905–1912.
Muskingum River at Frazier, Ohio, 1915–
Muskingum River at Beverly, Ohio, 1915–
Mohican River at Pomerene, Ohio, 1910–1913.
Licking River at Pleasant Valley, Ohio, 1902–1906.
Jonathan Creek at Powells, Ohio, 1902–3.
Little Kanawha River at Glenville, W. Va., 1915–
Little Kanawha River at Lock 4, Palestine, W. Va., 1915–
South Fork of Hughes River at Macfarlan, W. Va., 1915–
Hughes River at Cisko, W. Va., 1915–
Hocking River at Athens, Ohio, 1915–
New River, South Fork (head of New River, which in turn in head of Kanawha River) at New River, N. C., 1900–1901.
New River, South Fork, near Crumpler, N. C., 1908–1916.
New River near Oldtown, Va., 1900–1903.
New River near Grayson, Va., 1908–1912.
New River at Radford, Va., 1898–1906; 1907–1915.
New River at Eggleston, Va., 1914–
New River at Fayette, W. Va., 1895–1901; 1902–1904; 1908–1916.
Kanawha River at Lock 2 near Montgomery, W. Va., 1915–
North Fork of New River, near Crumpler, N. C., 1908–1916.
North Fork of New River at Weaversford, N. C., 1900–1901.
Reed Creek at Grahams Forge, Va., 1908–1916.
Big Reed Island Creek near Allisonia, Va., 1908–1916.
Little River near Copper Valley, Va., 1908–1916.
Walker Creek at Staffordsville, Va., 1908–1916.
Wolf Creek near Narrows, Va., 1908–1916.
Bluestone River at Lilly, W. Va., 1908–1916.
Bluestone River near True, W. Va., 1911–12.
Greenbrier River near Marlinton, W. Va., 1908–1916.
Greenbrier River at Alderson, W. Va., 1895–1906; 1907–
Gauley River at Allingdale, W. Va., 1908–1916.
Gauley River near Summersville, W. Va., 1908–1916.
Gauley River near Belva, W. Va., 1908–1916.
Cherry River at Richwood, W. Va., 1908–1916.
Meadow River near Russellville, W. Va., 1908–1916.

Ohio River tributaries—Continued.
Kanawha River tributaries—Continued.
Elk River at Webster Springs, W. Va., 1908–1916.
Elk River at Gassaway, W. Va., 1908–1916.
Elk River at Clendenin, W. Va., 1908–1916.
Coal River at Brushton, W. Va., 1908–1916.
Coal River at Fuqua, W. Va., 1911–1916.
Coal River at Tornado, W. Va., 1908–1912.
Little Coal River at McCorkle, W. Va., 1915–
Pocotalico River at Sissonville, W. Va., 1908–1916.
Raccoon Creek at Adamsville, Ohio, 1915–
Guyandot River at Wilber, W. Va., 1915–
Guyandot River at Branchland, W. Va., 1915–
Mud River at Yates, W. Va., 1915–
Twelvepole Creek at Wayne, W. Va., 1915–
Levisa River (head of Big Sandy River) at Thelma, Ky., 1915–
Tug River at Kermit, W. Va., 1915–
Blaine Creek at Yatesville, Ky., 1915–
Scioto River near Columbus, Ohio, 1898–1901; 1903–1906.
Scioto River at Chillicothe, Ohio, 1914.
Scioto River at Waverly, Ohio, 1916–
Olentangy River near Columbus, Ohio, 1898–1901; 1903–1906.
Little Miami River near Morrow, Ohio, 1903.
Little Miami River at Loveland, Ohio, 1906.
Little Miami River at Plainville, Ohio, 1914–16.
East Fork Little Miami River at Perintown, Ohio, 1915–
Licking River at Farmers, Ky., 1915–
Licking River at Falmouth, Ky., 1914–1916.
Licking River at Catawba, Ky., 1916–
Licking River at Morning View, Ky., 1916.
South Fork of Licking River at Hayes, Ky., 1916–
South Fork of Licking River at Falmouth, Ky., 1915–16.
Mill Creek at Arlington Heights, Ohio, 1912–
Mill Creek at Cincinnati, Ohio, 1912–13.
Miami River at Sidney, Ohio, 1914–
Miami River at Piqua, Ohio, 1913–
Miami River at Tadmore, Ohio, 1914–
Miami River at Dayton, Ohio, 1905–1909; 1913–
Miami River at Franklin, Ohio, 1916–
Miami River at Hamilton, Ohio, 1910–
Miami River at Venice, Ohio, 1915–
Laramie Creek at Lockington, Ohio, 1915–
Stillwater River near West Milton, Ohio, 1914–
Mad River near Springfield, Ohio, 1904–1906; 1914–
Mad River near Dayton, Ohio, 1914–
Buck Creek at Springfield, Ohio, 1914–
Twin Creek near Germantown, Ohio, 1914–
Fourmile Creek near Sevenmile, Ohio, 1914–
Sevenmile Creek at Sevenmile, Ohio, 1914–
Whitewater River at Brookville, Ind., 1915–
Kentucky River at Frankfort, Ky., 1905–6.
Dix River near Danville, Ky., 1905–6.
Dix River near Burgin, Ky., 1910–
Elkhorn Creek at Forks of Elkhorn, Ky., 1915–
Eagle Creek at Glencoe, Ky., 1915–

Ohio River tributaries—Continued.
Rolling Fork of Salt River (head of Salt River) at New Haven, Ky., 1905–6.
Green River at Munfordville, Ky., 1915–
Wabash River at Logansport, Ind., 1903–1906.
Wabash River at La Fayette, Ind., 1901–1903.
Wabash River at Terre Haute, Ind., 1902–1904; 1905–6.
Wabash River at Mount Carmel, Ill., 1909–1913.
Eel River at Logansport, Ind., 1903.
Tippecanoe River at Springboro, near Delphi, Ind., 1903–1906; 1908.
Vermilion River near Danville, Ill., 1914–
Embarrass River near Oakland, Ill., 1909–1912; 1914–15.
Embarrass River at Ste. Marie, Ill., 1909–1912; 1914–
White River, West Branch (head of White River) at Indianapolis, Ind. 1904–1906.
White River, West Branch at Noblesville, Ind., 1915–
Eel River at Cataract, Ind., 1903–1906.
East Branch of White River at Shoals, Ind., 1903–1906; 1909–1916.
Little Wabash River near Clay City, Ill., 1908–1912.
Little Wabash River at Wilcox, Ill., 1914–
Little Wabash River near Golden Gate, Ill., 1908–1912.
Little Wabash River at Carmi, Ill., 1908–1912.
Skillet Fork near Wayne City, Ill., 1908–1912; 1914–
Skillet Fork near Mill Shoals, Ill., 1908–1912.
Cumberland River at Cumberland Falls, Ky., 1907–1911; 1915–
Cumberland River at Burnside, Ky., 1915–
Cumberland River at Nashville, Tenn., 1902–1904.
South Fork of Cumberland River at Nevelsville, Ky., 1915–
French Broad River (head of Tennessee River) at Rosman, N. C., 1907–1909.
French Broad River at Horseshoe, N. C., 1904–1906.
French Broad River at Asheville, N. C., 1895–1901; 1904–
French Broad River at Oldtown, near Newport, Tenn., 1900–1905; 1907.
Tennessee River at Knoxville, Tenn., 1900–1912.
Tennessee River at Chattanooga, Tenn., 1897–1913; 1915–
Tennessee River at Florence, Ala., 1871–
Tennessee River at Johnsonville, Tenn., 1875–
Davidson River near Davidson River, N. C., 1904–1909.
Little River at Calhoun, N. C., 1907–8.
Mills River, South Fork (head of Mills River), near Sitton, N. C., 1904–1909.
North Fork of Mills River at Pinkbed, N. C., 1904–1909.
Mud Creek at Naples, N. C., 1907.
Swannanoa River at Swannanoa, N. C., 1907–1909.
Swannanoa River at Biltmore, N. C., 1904.
Ivy River at Democrat, N. C., 1907.
Pigeon River at Canton, N. C., 1907–1909.
Pigeon River at Newport, Tenn., 1900–1901; 1903–1905; 1906–1909.
Nolichucky River at Chucky Valley, Tenn., 1900–1901.
Nolichucky River at Greenville, Tenn., 1903–1908.
North Toe River at Spruce Pine, N. C., 1907–8.
Holston River, South Fork (head of Holston River), near Chilhowie, Va., 1907–1909.
Holston River, South Fork, at Bluff City, Tenn., 1900–
Holston River near Rogersville, Tenn., 1904–
Middle Fork of Holston River at Chilhowie, Va., 1900–1909.
Watauga River at Butler, Tenn., 1900–1901.
Watauga River near Elizabethton, Tenn., 1903–1908.
Elk Creek at Lineback, Tenn., 1900–1901.

Ohio River tributaries—Continued.
Tennessee River tributaries—Continued.
Holston River tributaries—Continued.
Roane Creek at Butler, Tenn., 1900–1901.
Doe River at Blevins, Tenn., 1911–1915.
Doe River at Valley Forge, Tenn., 1911–1916.
Doe River at Elizabethton, Tenn., 1907–8; 1912.
North Fork of Holston River at Saltville, Va., 1907–8.
Little Tennessee River near Franklin, N. C., 1907–1910.
Little Tennessee River at Judson, N. C., 1896–
Little Tennessee River at McGhee, Tenn., 1905–1914.
Cullasagee River at Cullasagee, N. C., 1907–1909.
Nantahala River near Nantahala, N. C., 1907–1909.
Tuckasegee River near East Laport, N. C., 1907–1909.
Tuckasegee River at Bryson, N. C., 1897–
Scott Creek near Dillsboro, N. C., 1907–8.
Oconalufty River near Cherokee, N. C., 1907–8.
Cheoah River at Millsaps, N. C., 1907–8.
Clinch River at Clinchport, Va., 1907–1909.
Hiwassee River near Hayesville, N. C., 1907–1909.
Hiwassee River at Murphy, N. C., 1897–
Hiwassee River at Reliance, Tenn., 1900–1913.
Hiwassee River at Charleston, Tenn., 1899–1902.
Tusquitee Creek near Hayesville, N. C., 1907–1909.
Valley River at Tomotla, N. C., 1904–1909; 1914–
Nottely River at Ranger, N. C., 1901–1905; 1914–
Toccoa River (head of Ocoee River) near Dial, Ga., 1907–8; 1913–
Toccoa River near Blueridge, Ga., 1898–1903.
Toccoa River near Morganton, Ga., 1913–
Ocoee River at McCays (Copper Hill), Tenn., 1903–1913.
Ocoee River at Emf, Tenn., 1913–
Ocoee River at Parksville, Tenn., 1913–
Big Bear River near Red Bay, Ala., 1913–
Elk River near Elkmont, Ala., 1904–1908.
Duck River at Columbia, Tenn., 1904–1908.

REPORTS ON WATER RESOURCES OF THE OHIO RIVER BASIN.[1]

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk, (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Water-supply papers are of octavo size.

*21. Wells of northern Indiana, by Frank Leverett. 1899. 82 pp., 2 pls. (Continued in No. 26.)

Discusses by counties the glacial deposits and the sources of well waters; gives many well sections.

*24. Water resources of the State of New York, Part I, by G. W. Rafter. 1899. 99 pp., 13 pls. 15c.

*25. Water resources of the State of New York, Part II, by G. W. Rafter. 1899. 100 pp., 12 pls. 15c.

No. 24 contains descriptions of the principal rivers of New York and their more important tributaries, and data on temperature, precipitation, evaporation, and stream flow.

No. 25 contains discussion of water-storage projects on Genesee and Hudson rivers, power development at Niagara Falls, descriptions and early history of State canals, and a chapter on the use and value of the water power of the streams and canals; also brief discussion of the water yield of sand areas of Long Island.

[1] For stream-measurement reports see tables on p. VI.

*26. Wells of southern Indiana (continuation of No. 21), by Frank Leverett. 1899. 64 pp. 5c.

Discusses by counties the glacial deposits and the sources of well water; contains many well sections.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevations and distances along rivers of the United States, and brief descriptions of many of the streams, including Ohio River and a number of its tributaries.

*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. 5c.

*61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

A second, revised, edition of Nos. 57 and 61 was published in 1905 as Water-Supply Paper 149 (q. v.).

62. Hydrography of the southern Appalachian Mountain reigon, Part I, by H. A. Pressey. 1902. 95 pp., 25 pls. 15c.

63. Hydrography of the southern Appalachian Mountain region, Part II, by H. A. Pressey. 1902. pp. 96–190, pls. 26–44. 15c.

Nos. 62 and 63 describe in a general way the mountains, rivers, climate, forests, soil, vegetation, and mineral resources of the southern Appalachian Mountains, and then discuss in detail the drainage basins, giving for each an account of the physical features, rainfall, forests, minerals, transportation, discharge measurements, and water powers. Most of the streams described are tributary through Tennessee River to the Ohio, but Part II (No. 63) includes also descriptions of several streams in the south Atlantic and eastern Gulf of Mexico drainage basins.

79. Normal and polluted waters in northeastern United States, by M. O. Leighton. 1903. 192 pp. 10c.

Defines essential qualities of water for various uses, the impurities in rain, surface, and ground waters, the meaning and importance of sanitary analyses, and the principal sources of pollution; chiefly "a review of the more readily available records" of examination of water supplies derived from streams in the Merrimack, Connecticut, Housatonic, Delaware, and Ohio, River basins; contains many analyses.

91. The natural features and economic development of the Sandusky, Maumee, Muskingum, and Miami drainage areas in Ohio, by B. H. and M. S. Flynn. 1904. 130 pp. 10c.

Describes the topography, geology, and soils of the areas and discusses stream flow, dams, water powers, and public water supplies.

96. Destructive floods in the United States in 1903, by E. C. Murphy. 1904. 81 pp., 13 pls. 15c.

Contains notes on early floods in Mississippi Valley.

102. Contributions to the hydrology of eastern United States, 1903; M. L. Fuller, geologist in charge. 1904. 522 pp. 30c.

Contain brief reports on springs and wells of Alabama, Georgia, Tennessee, and Kentucky. The reports comprise tabulated well records giving information as to location, owner, depth, yield, head, etc., supplemented by notes as to elevation above sea, materials penetrated, temperature, use, and quality; many miscellaneous analyses.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. See 152.

Cites statutory restrictions of water pollution in Alabama, Indiana, Illinois, Kentucky, Maryland, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

*107. Water powers of Alabama, with an appendix on stream measurements in Mississippi, by B. M. Hall. 1904. 253 pp., 9 pls. 20c.

Contains gage heights, rating tables, estimates of monthly discharge at stations on Tallapoosa, Coosa, Alabama, Cahaba, Black Warrior, Tombigbee, and Tennessee rivers and their tributaries; gives estimates and short descriptions of water powers.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c. Contains:

Water resources of the Middlesboro-Harlan region of southeastern Kentucky, by George H. Ashley. Describes topographic features of the area and the water supply of Middlesboro and Pineville.

Water resources of the Cowee and Pisgah quadrangles, North Carolina, by Hoyt S. Gale. Discusses drainage, springs, and waters of one of the units of the geologic atlas of the United States.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

Contains a brief report on the topography, drainage, geology, and the pollution of wells and streams by oil waste and brine in an area drained by Mississinewa River, a tributary of the Wabash.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge, 1905. 285 pp., 18 pls. 25c.

Contains brief reports relating to Ohio River drainage areas, as follows:
Tennessee and Kentucky, by L. C. Glenn.
Ohio, by Frank Leverett.
Illinois, by Frank Leverett.
West Virginia, by M. L. Fuller.
Indiana, by Frank Leverett.
North Carolina, by M. L. Fuller.
South Carolina, by L. C. Glenn.
Georgia, by S. W. McCallie.
Alabama, by E. A. Smith.

Each of these reports describes the geology of the area in its relation to water supplies, notes the principal mineral springs, and gives list of pertinent publications.

115. River surveys and profiles made during 1903, arranged by W. C. Hall and J. C. Hoyt. 1905. 115 pp., 4 pls. 10c.

Contains results of surveys made to determine location of undeveloped power sites. Gives elevations and distances along Hiwassee, Nottely, and Toccoa rivers.

144. The normal distribution of chlorine in the natural waters of New York and New England, by D. D. Jackson. 1905. 31 pp., 5 pls. 10c.

Discusses common salt in coast and inland waters, salt as an index to pollution of streams and wells, the solutions and methods used in chlorine determinations, and the use of the normal chlorine map; gives charts and tables for chlorine in the New England States and New York.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains "Water resources of the Nicholas quadrangle, West Virginia," by George H. Ashley Describes topography, geology, and domestic water supply of the hilly region in central West Virginia, a little east of New and Kanawha rivers.

147. Destructive floods in United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c.

Describes Wabash River flood, Indiana, causes of flood discharge, damage, and prevention of damage; also the drought in the Ohio River basin, its causes and effects; flood in Scottdale Valley, caused by failure of dam on Jacobs Creek (tributary to the Ohio through Youghiogheny River).

149. Preliminary list of deep borings in the United States, second edition with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives by States (and within the States by counties), location, depth, diameter, yield, height of water, and other valuable information concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Cites statutory restrictions of water pollution in Alabama, Illinois, Indiana, Kentucky Maryland, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

159. Summary of the underground-water resources of Mississippi, by A. F. Crider and L. C. Johnson. 1906. 86 pp., 6 pls. 20c.

Describes geography, topography, and general geology of the State; discusses the source, depth of penetration, rate of percolation, and recovery of ground waters; artesian requisites, and special conditions in the Coastal Plain formations; gives notes on wells by counties, deep-well records, and selected records in detail; treats of sanitary aspect of wells and gives analyses.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives accounts of floods on Allegheny and Ohio rivers, and estimates of flood discharge and frequency on Monongahela, Youghiogheny, and Tennessee rivers.

*164. Underground waters of Tennessee and Kentucky west of Tennessee River and of an adjacent area in Illinois, by L. C. Glenn. 1906. 173 pp., 7 pls. 25c.

Describes static level and uses of waters, artesian conditions, and source and properties of ground water; discusses topography, geology, and water resources by counties; gives logs of wells, analyses of waters, and bibliography of most important reports.

*197. Water resources of Georgia, by B. M. and M. R. Hall. 1907. 342 pp., 1 pl. 50c.

Describes topographic and geologic features of the State; discusses by drainage basins stream flow, river surveys, and water powers.

233. Water resources of the Blue Grass region, Kentucky, by G. C. Matson, with a chapter on the quality of the waters, by Chase Palmer. 1909. 223 pp., 3 pls. 20c.

Describes the geologic formations, physiographic features, soils, and surface waters of the region; the source, conditions of occurrence, amount and recovery of the ground waters, collection and storage of rain water, municipal water supplies, and conditions in each county discusses under "Quality" the industrial uses of the water, comparative hardness, and mineral and table waters; many analyses.

236. The quality of surface waters in the United States: Part I.—Analyses of waters east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results; gives results of analyses of waters of Allegheny, Cumberland, Kentucky, Miami, Wabash, and Tennessee rivers and some of their tributaries.

239. The quality of the surface waters of Illinois, by W. D. Collins. 1910. 94 pp., 3 pls. 10c.

Discusses the natural and economic features that determine the character of the streams; describes the larger drainage basins and the methods of collecting and analyzing the samples of water, and discusses each river in detail with reference to its source, course, and quality of water; includes short chapters on municipal supplies and industrial uses.

254. The underground waters of north-central Indiana, by S. R. Capps, with a chapter on the chemical character of the waters, by R. B. Dole. 1910. 279 pp., 7 pls. 40c.

Describes relief, drainage, vegetation, soils, and crops, industrial development, and geologic formations; source, movements, occurrence and volume of ground water; methods of well construction and lifting devices; discusses in detail for each county surface features and drainage; geology and ground water, city, village, and rural supplies, and gives records of wells and analyses of waters. Discusses also, under chemical character, methods of analyses and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial, and medicinal uses, methods of purification, chemical composition; many analyses and field assays.

259. The underground waters of southwestern Ohio, by M. L. Fuller and F. G. Clapp, with a discussion of the chemical character of the waters, by R. B. Dole. 1912. 228 pp., 9 pls. 35c.

Describes the topography, climate, and geology of the region, the water-bearing formations the source, mode of occurence, and head of the waters, and municipal supplies; gives details by counties; discusses in supplement, under chemical character, method of analyses and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial, or medicinal uses, methods of purification, chemical composition; many analyses and field assays. The matter in the supplement was also published in Water-Supply Paper 254 (The underground waters of north-central Indiana).

334. The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

PROFESSIONAL PAPERS.

Professional papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

*37. The southern Appalachian forests, by H. B. Ayres and W. W. Ashe. 1905. 291 pp., 37 pls. 80c.

Describes the relief, drainage, climate, natural resources, scenery, and water supply of the southern Appalachian forests, the trees, shrubs, and rate of growth; gives details concerning forests by drainage basins, including New, Holston (southern tributaries of South Fork only), Watauga, Nolichucky, French Broad, Pigeon, Little Tennessee, Hiwassee, Tallulah-Chatooga, Toxaway, Saluda, and First and Second Broad rivers, Catawba and Yadkin rivers, describing many of the tributaries of each of the master streams.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee river basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Bulletins are of octavo size.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general method of work; gives tabulated records of wells in Illinois, Indiana, New York, Ohio, Pennsylvania, Tennessee, West Virginia, and Kentucky, and detailed records of wells in Delaware and Jay counties, Ind.; Greene, Warren, and Washington counties, Pa.; and Kanawha, Ritchie, and Wetzel counties, W. Va. These records were selected because they give definite stratigraphic information.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in Alabama, Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia, and detailed records of wells in Madison County, Ala., Crawford County, Ill.; Delaware, Martin, Randolph, and Vanderburg counties, Ind.; Hopkins and Metcalfe counties, Ky.; Hocking, Noble, Tuscarawas, and Wayne counties, Ohio; Armstrong, Greene, Somerset, Warren, and Washington counties, Pa.; and Cabell, Harrison, Marion, Monongalia, Wayne, and Wetzel counties, W. Va. The wells of which detailed records are given were selected because they afford definite stratigraphic information.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic

[1]Index maps showing areas in the Ohio River basin covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of spring and well waters from Pennsylvania, West Virginia, Kentucky, Tennessee, and Illinois, and of mine waters from Ducktown, Tenn.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate forms.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

Fourteenth annual report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II. Accompanying papers, pp. xx, 597, 73 pls. $2.10. Contains:

*The potable waters of the eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

Seventeenth Annual Report of the United States Geological Survey, 1895–96, Charles D. Walcott, Director. 1896. 3 parts in 4 vols. *Pt. II. Economic geology and hydrography, pp. xxv, 864, 113 pls. $2.35. Contains:

*The water resources of Illinois, by Frank Leverett, pp. 695–849, pls. 108 to 113. Describes the physical features of the State, and the drainage basins, including tributaries of the Mississippi in western Illinois, and tributaries of the Wabash; discusses the rainfall and run-off, navigable waters and water powers, the wells supplying water for rural districts, and artesian wells; contains tabulated artesian well data and water analyses.

Eighteenth Annual Report of the United States Geological Survey, 1896–97, Charles D. Walcott, Director. 1897. (Pts. II and III, 1898.) 5 parts in 6 vols. *Pt. IV, Hydrography, pp. x, 756, 102 pls $1.75. Contains:

*The water resources of Indiana and Ohio, by Frank Leverett, pp. 419–560, pls. 33 to 37. Describes the Wabash, Whitewater, Great Miami, Little Miami, Scioto, Hocking, Muskingum, and Beaver rivers and lesser tributaries of the Ohio in Indiana and Ohio, the streams discharging into Lake Erie and Lake Michigan, and streams flowing to the upper Mississippi through the Illinois; discusses shallow and drift wells, the flowing wells from the drift and deeper artesian wells, and gives records of wells at many of the cities; describes the mineral springs, and gives analyses of the waters; contains also tabulated lists of cities using surface waters for waterworks, and of cities and villages using shallow and deep well waters; discusses the source and quality of the city and village supplies; and gives precipitation tables for various points.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Pts. II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. IV, Hydrography, pp. viii, 814, 118 plates. $1.85. Contains:

*The rock waters of Ohio, by Edward Orton, pp. 633–717, pls. 71 to 73. Describes the principal geologic formations of Ohio and the waters from the different strata; discusses the flowing wells at various points and the artesian wells of pre-Glacial channels in Allen, Auglaize, and Mercer counties; discusses city and village supplies; gives analyses of waters from various formations.

MONOGRAPHS.

Monographs are of quarto size. They are not distributed free, but may be obtained from the Geological Survey or from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C., at the prices indicated. An asterisk (*) indicates that the Survey's stock of the paper is exhausted.

XLI. Glacial formations and drainage features of the Erie and Ohio basins, by Frank Leverett. 1902. 802 pp., 26 pls. $1.75.

Treats of an area extending westward from Genessee Valley in New York across northwestern Pennsylvania and Ohio, central and southern Indiana, and southward from Lakes Ontario and Erie to the vicinity of Allegheny and Ohio rivers.

172. Warren,[1] Pennsylvania-New York. 5c.

174. Johnstown,[1] Pennsylvania. 5c.
Describes the city water supply at Johnstown and the water resources of the quadrangle in general.

176. Sewickley, Pennsylvania. 5c.

177. Burgettstown-Carnegie,[2] Pennsylvania. 5c.
Contains partial well records.

180. Claysville, Pennsylvania. 5c.

187. Ellijay, Georgia-North Carolina-Tennessee. 25c.
Contains brief paragraph on water power.

189. Barnesboro-Patton, Pennsylvania. 25c.

197. Columbus, Ohio. Library edition, 25c.; octavo edition, 50c.
Gives brief description of the water supply of Columbus and analyses of the mineral content of the water of Scioto River.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of the various sections of the country. Notable among those pertaining to the Ohio River basin are the reports of the Chief of Engineers, United States Army; the State geological surveys of Alabama, Illinois, Kentucky, North Carolina, Tennessee, and Virginia; the Illinois Water-Supply Commission and the Rivers and Lakes Commission of Illinois; the New York State Conservation Commission and State Water-Supply Commission; the Water-Supply Commission of Pennsylvania and the Pittsburgh Flood Commission; and the water-power report of the Tenth Census (vol. 17). The following reports deserve special mention:

The Mississippi and Ohio rivers, by Charles H. Ellet. 1853.

Report upon the physics and hydraulics of the Mississippi Rivers, by A. A. Humphreys and H. L. Abbot. 1861.

Preliminary report on a part of the water powers of Alabama, by B. M. Hall; Alabama Geol. Survey Bull. 7, 1903.

The underground water resources of Alabama, by Eugene A. Smith; Alabama Geol. Survey Mon. 6, 1907.

Preliminary report on a part of the water powers of Georgia, compiled by B. M. Hall: Georgia Geol. Survey Bull. 3 A, 1896.

Preliminary report on the underground waters of Georgia, by S. W. McCallie: Georgia Geol. Survey Bull. 15, 1908.

The mineral content of Illinois waters by Edward Bartow, J. A. Udden, S. W. Parr, and George T. Palmer: Illinois State Geol. Survey Bull. 10, 1909.

Chemical survey of the waters of Illinois, report for the years 1897–1902, by A. W. Palmer, with Geology of Illinois as related to its water supply, by Charles W. Rolfe: University of Illinois publications.

Chemical and biological survey of waters of Illinois, by Edward Bartow: University of Illinois publications 3, 6, 7, 1906–1909.

Report upon the prevention of overflow of Little Wabash and Skillet Fork rivers, by W. J. McEathron and L. L. Hidinger. Rivers and Lakes Commission, 1911.

Papers on the water power of North Carolina, a preliminary report by George F. Swain: North Carolina Geol. Survey Bull. 8, 1899.

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[1] Issued in two editions. (See p. xiv.) Specify which edition is wanted.
[2] Library edition out of stock.

and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to underground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology, and are valuable as guides in the development and utilization of mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but many of the folios are usable. They are sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive (except reprints); also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sells for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell at higher prices. The octavo edition of folio 185 and higher numbers sell for 50 cents a copy, except folio 193, which sells for 75 cents a copy. A discount of 40 per cent is allowed on an order for folios or for folios together with topographic maps amounting to $5 or more at the retail rate.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*16. Knoxville folio, Tennessee-North Carolina.

67. Danville folio, Illinois-Indiana. 5c.
Discusses the shallow dug or open wells, the tubular wells, and the flowing wells; gives also tabulated data concerning depth, head, water-bearing bed, etc., of the wells in the quadrangle.

84. Ditney folio, Indiana. 5c.

90. Cranberry folio, North Carolina-Tennessee. 5c.

102. Indiana folio, Pennsylvania. 5c.
Indicates promising localities for artesian water.

105. Patoka folio, Indiana-Illinois. 5c.
Discusses the water supply of the streams, springs, wells, cisterns, and artificial ponds.

*121. Waynesburg folio, Pennsylvania.

123. Elders Ridge, Pennsylvania. 5c.

*124. Mount Mitchell, North Carolina-Tennessee.
Describe water powers and the various sources of water used for industrial and domestic supplies.

*144. Amity, Pennsylvania.
Gives a brief discussion of the water supply of the town of Washington.

146. Rogersville, Pennsylvania.

*147. Pisgah, North Carolina-South Carolina.

*151. Roan Mountain, Tennessee-North Carolina.

160. Accident-Grantsville, Maryland-Pennsylvania-West Virginia. 5c.
Notes possibility of obtaining artesian water.

104789°—18—WSP 433——15

Report of the investigations into the purification of the Ohio River water for the improved water supply of the city of Cincinnati, Ohio; made by the board of trustees, commissioners of waterworks, Cincinnati, 1899.

Progress report on a plan of sewerage for the city of Cincinnati, 1912–13.

The mineral waters of Indiana, their location, origin, and character, by W. S. Blatchley: Indiana Dept. Geology and Nat. Res. Twenty-sixth Ann. Rept. 1901.

Report on the value of the Dix River as a source of water power, by August F. Foerste, and Supplementary report on Dix River, by August F. Foerste: Kentucky Geol. Survey Bull. 21, 1912.

Underground waters of Mississippi, a preliminary report, by W. N. Logan and W. R. Perkins: Mississippi Agr. Exper. Sta. Bull. 89.

Hydrology of the State of New York, by George W. Rafter: New York State Mus. Bull. 85, 1905.

A report to the mayor and city council on flood protection for the city of Columbus, Ohio, 1913.

Report of the filtration commission of the city of Pittsburgh, Pa., 1899.

The water powers of Tennessee, by J. A. Switzer, including a report on Doe River, by A. H. Horton: Tennessee Geol. Survey Bull. 17, 1914.

Hydrography of Virginia, by N. C. Grover and R. H. Bolster: Virginia Geol. Survey Bull. 3, 1906.

Surface water supply of Virginia, by G. C. Stevens: Virginia Geol. Survey Bull. 10, 1916.

Report of the Secretary of Agriculture in relation to the forests, rivers, and mountains of the Southern Appalachian region: 57th Congress, 1st sess., S. Doc. 84, 1902.

Many of these reports can be obtained by applying to the several commissions, and most of them can be consulted in the public libraries of the larger cities.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, H. M. Wilson. 1896. 57 pp., 9 pls.
Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.
Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.
Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl.
Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.
Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.
Gives résumé of Water-Supply Paper 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill: Its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 5c.

*42. The windmill: Its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp. (73-147), 2 pls. (15-16). 10c.
Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.
Describes the methods used by the Survey in 1901-2. (See also Nos. 64, 94, and 95.)

*64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.
Describes methods of measuring velocity of water and of measuring and computing stream flow and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged, edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.
Discusses origin, depth, and amount of ground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of ground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yields of flowing wells; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.
Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.
Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effects of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp. 27 pls. 25c.
First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this report should be addressed to the United States Reclamation Service.]
Contains, the following papers of more or less general interest:
Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by George Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.
Gives instruction for field and office work relating to measurements of stream flow by current meters. (See also No. 95.)

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.
Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. (See also No. 94.)

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)
Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States. 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.
Contains the following reports of general interest. The scope of each paper is indicated by its title.
Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.
The California or "stovepipe" method of well construction, by Charles S. Slichter.
Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.
Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.
Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.
The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., the contamination of rock wells and of streams by waste-oil and brine.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.
Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting ground waters in eastern United States.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.
Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.
Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal., and on Long Island, N. Y.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls. 5c.
Scope indicated by title.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.
Contains brief reports of general interest as follows:
Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.
Construction of so-called fountain and geyser springs, by Myron L. Fuller.
A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Requests for this report should be addressed to the United States Reclamation Service.]
267 pp. 15c.
Contains brief account of the organization of the hydrographic [water resources] branch and the Reclamation Service, reports of conferences and committees, circulars of instruction, and many brief reports on subjects closely related to reclamation, and a bibliography of technical papers by members of the service. Of the papers read at the conference those listed below (scope indicated by title) are of more or less general interest:
Proposed State code of water laws, by Morris Bien.
Power engineering applied to irrigation problems, by O. H. Ensign.
Estimates on tunneling in irrigation projects, by A. L. Fellows.
Collection of stream-gaging data, by N. C. Grover.
Diamond-drill methods by G. A. Hammond.
Mean-velocity and area curves, by F. W. Hanna.
Importance of general hydrographic data concerning basins of streams gaged, by R. E. Horton.
Effect of aquatic vegetation on stream flow, by R. E. Horton.
Sanitary regulations governing construction camps, by M. O. Leighton.
Necessity of draining irrigated land, by Thomas H. Means.
Alkali soils, by Thomas H. Means.
Cost of stream-gaging work, by E. C. Murphy.
Equipment of a cable gaging station, by E. C. Murphy.
Silting of reservoirs, by W. M. Reed.
Farm-unit classification, by D. W. Ross.
Cost of power for pumping irrigating water, by H. A. Storrs.
Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in United States in 1894, by E. C. Murphy and others. 206 pp., 18 pls. 15c.
Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and areas of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.
Scope indicated by title.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls.
Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

*152. A review of the laws forbidding pollution of inlandwaters in the United States, second edition, by E. B. Goodell. 1905. 149 pp. 10c.
Scope indicated by title.

*155. Fluctuations of the water level in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.
Includes general discussion of fluctuations due to rainfall and evaporation, barometric changes, temperature changes, changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, ground-water developments, and to indeterminate causes.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.
Gives account of work in 1905, lists of publications relating to ground waters, and contains the following brief reports of general interest:
Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground water, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c
Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.
Describes grain distillation, treatment of slop, sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.
Scope indicated by title.

*185. Investigations on the purification of Boston sewage, * * * with a history of the sewage problem, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.
Discusses composition, disposal, purification, and treatment of sewages and tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes: a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.
Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl.
Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.
Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* The State of Illinios and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls.
Scope indicated by amplification of title.

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.
Scope indicated by title.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1908. 37 pp., 1 pl. 10c.
Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage-filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.
Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.
Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.
Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States: Part I.—Analyses of waters east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.
Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.
Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament; reviews work of bureau of hydraulics and agricultural improvements of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.
Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs, and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.
Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of ground water, artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties; contamination of well water and methods of prevention; tests of capacity and measurement of depth; and costs of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 135 pp., 2 pls. 15c.
Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

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 by Herman Stabler. 1911. 188 pp. 15c.
Describes collection of samples, plan of annalytical work, and methods of analyses; discusses soap-consuming power of waters, water-softening, boiler waters, and waters for irrigation.

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water, and municipal water softening.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 71 pp., 7 pls. 15c.

Discusses methods of measuring water flow of streams.

*345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

*(e) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp. 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

*375. Contributions to the hydrology of the United States, 1915. N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c.

Contains three papers presented at the conference of engineers of the water-resources branch in December, 1914.

*(c) Relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

(e) A method of correcting river discharge for changing stage, by B. E. Jones, pp. 117–130.

(f) Conditions requiring the use of automatic gages in obtaining stream-flow records, by C. H. Pierce, pp. 131–139.

*400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer. 1917. 108 pp., 7 pls. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

*(c) The measurement of silt-laden streams, by Raymond C. Pierce, pp. 39–51.

(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

416. The divining rod, a history of water witching, with a bibliography, by A. J. Ellis. 1917. 59 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

425. Contributions to the hydrology of the United States, 1917. W. C. Grover, chief hydraulic engineer. 1918. Contains:

*(c) Hydraulic conversion tables and convenient equivalents, pp. 71–94. 1917.

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, pl. 21. Scope indicated by title.

*Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, pls. 107 to 146. (See Water-Supply Paper 37.)

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. 111 to 146. Discusses the economic aspects of irrigation, alkaline drainage, silt and sedimentation; gives brie history of legislation; describes perennial canals in Idaho-California, Wyoming, and Arizona; discusses water-storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of the eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v, 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, pls. 6 to 16. Discusses the amount of water stored in sandstone, in soil, and in other rocks, the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous medium, and through sands, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, pl. 17. Scope indicated by title.

PROFESSIONAL PAPERS.

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Cal., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller. 1908. 10c.

Describes underground reservoirs, the sources of ground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water, and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

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[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

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