DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 403

SURFACE WATER SUPPLY OF THE UNITED STATES

1915

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, Kentucky, and West Virginia

WASHINGTON
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SURFACE WATER SUPPLY OF OHIO RIVER BASIN. 1915.

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, 1915.

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 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil 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 ending June 30, 1895–1916.

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 1916, 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 3,800 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1915, 1,350 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 the rate of flow, as second-feet, gallons per minute, miner's 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 (pp. 9–11).

"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 common use are here defined:

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

"Control," "controlling section," and "point of control," terms used to designate the section or sections of the stream below the gage which determine the 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=0.681818 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 Colorado 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 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.
1½ 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, 1914, and ending September 30, 1915. At the first 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 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 a year beginning with October 1 is practically all derived from precipitation in 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 by the general methods outlined in standard text books on the measurement of river discharge. (See Pls. I and II.)

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

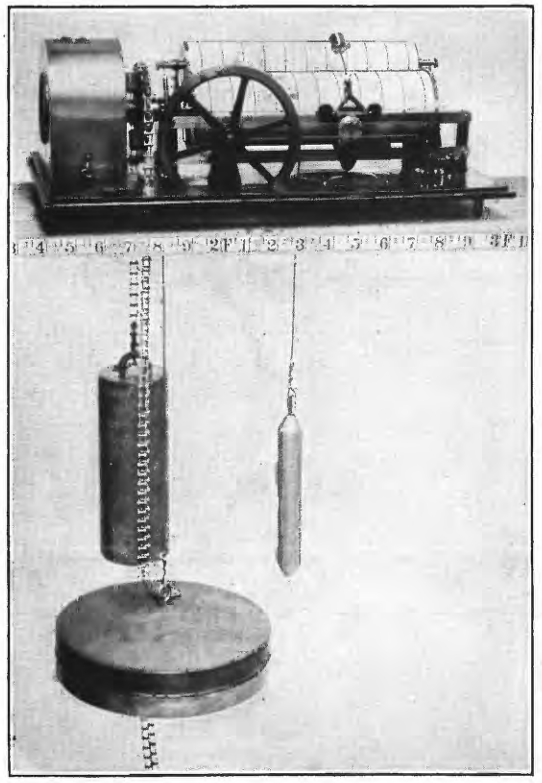
The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream. and a table of monthly and yearly discharge and run-off.

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

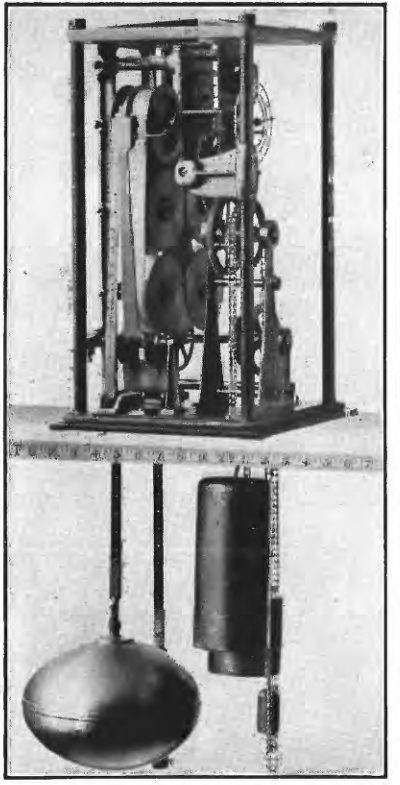
The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the constancy of the discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of channel, 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 in general gives 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 weighting discharge for parts of the day.

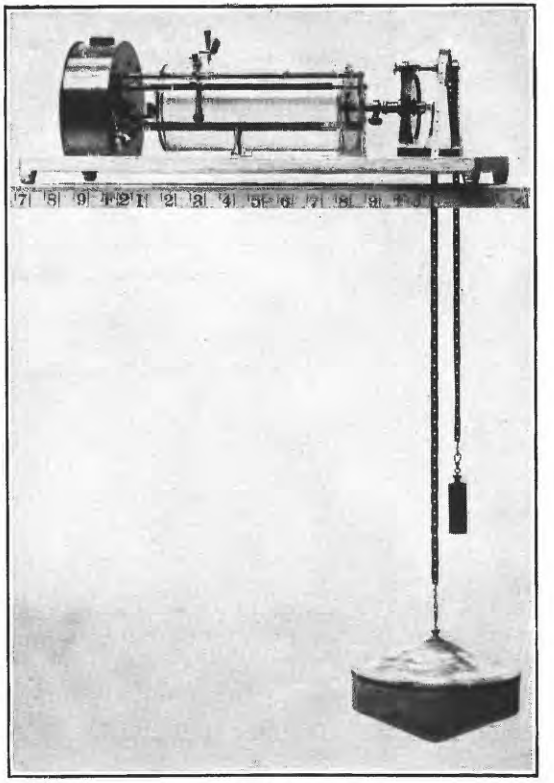
In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger 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 page 13, are based.



A. STEVENS.

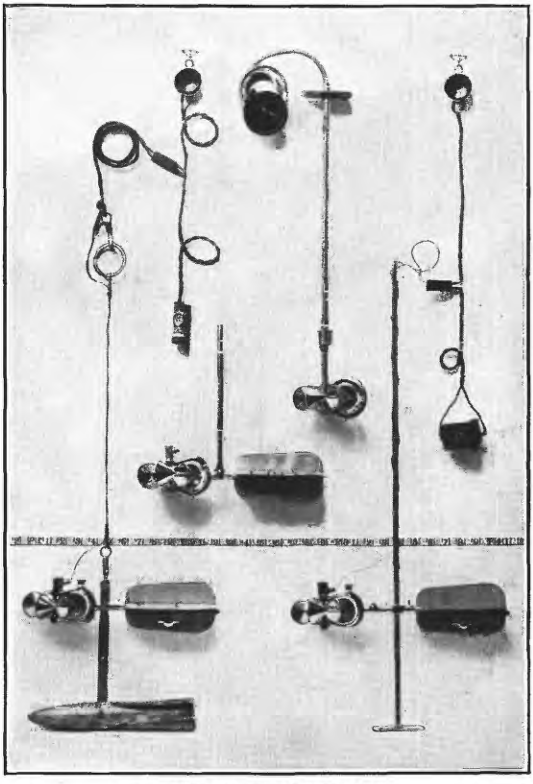


B. GURLEY PRINTING.

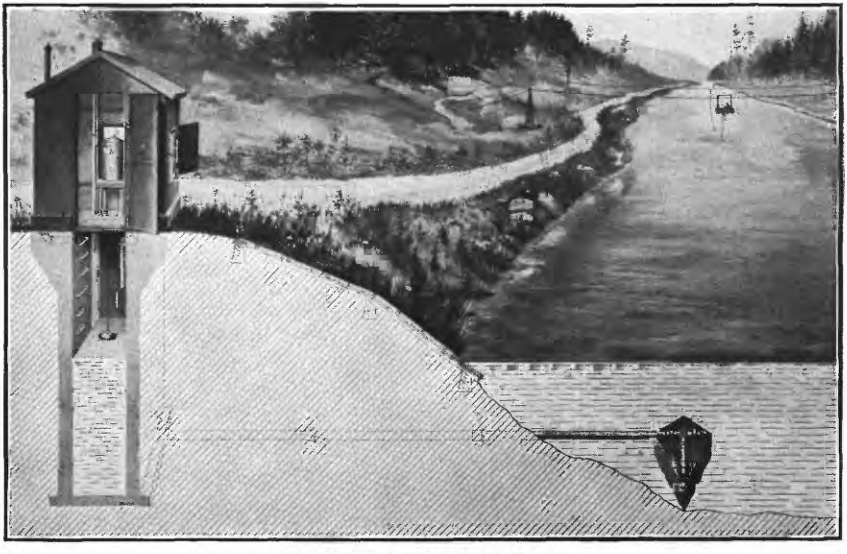


C. FRIEZ.

WATER-STAGE RECORDERS.



A. PRICE CURRENT METERS.



B. TYPICAL GAGING STATION.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

Footnotes added to the daily discharge tables give information regarding the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. 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" or "approximate," 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 letter in the column headed "Accuracy," in the table showing monthly discharge, rates the accuracy of the monthly mean and not that of the estimate of maximum or minimum discharge or the discharge for any one day. The rating is determined by considering the accuracy of the rating curve, the probable reliability of the observer, the number of gage readings per day, the range of the fluctuation in stage, and local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

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 non-contributing districts in the measured drainage area, by lack of information 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 ending September 30, 1915, was carried on in cooperation with the State of Illinois Rivers and Lakes Commission and the State Geological Survey, F. W. De Wolf, director.

The State of West Virginia cooperated through the State geologist, I. C. White, in the maintenance of some of the gaging stations in West Virginia.

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

The United States Army engineers cooperated in the establishment and maintenance of about 25 gaging stations in the Ohio River basin above Big Sandy River and stations in Tennessee River basin.

Financial assistance was also rendered by the Alabama Geological Survey, the Tennessee Power Co., H. F. Van Deventer, and the Hydroelectric Co., of West Virginia.

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 C. S. De Golyer.

Data for the Ohio River basin, except those for the Allegheny at Red House, N. Y., and for the basin of Tennessee River, were collected and prepared for publication under the direction of A. H. Horton, district engineer, assisted by C. E. Ellsworth, B. J. Peterson, J. H. Morgan, William Kessler, J. G. Mathers, B. E. Jones, and J. C. Dort.

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 M. R. Hall, L. J. Hall, and Frank Lederle.

The records were assembled and reviewed by B. E. Jones and B. J. Peterson.

GAGING-STATION RECORDS.

ALLEGHENY RIVER BASIN.

ALLEGHENY RIVER AT RED HOUSE, N. Y.

LOCATION.—At highway bridge at Red House, Cattaraugus County, on the road leading from the Pennsylvania Railroad station to the Erie Railroad station, 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, 1915. Data also in annual reports of State of New York Conservation Commission and the New York State engineer and surveyor.

GAGE.—Chain, attached to the upstream side of bridge near left-hand end; read by W. E. Coe, once daily to half tenths October 1 to May 20, and twice daily May 21 to September 30.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Coarse gravel, occasionally shifting. Current good for medium and high stages; rather slow at low stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.65 feet at 3 p. m. February 25 (discharge, 19,000 second-feet); minimum stage recorded, 3.0 feet at 1 p. m. October 2, 4, and 7 (discharge, 205 second-feet).

1903–1915: Maximum stage recorded, 12.7 feet March 26, 1913 (discharge, approximately 40,000 second-feet); minimum stage recorded, 2.7 feet on several days in December, 1908 (discharge, approximately 100 second-feet).

WINTER FLOW.—Discharge relation affected by ice and gage operations suspended for short periods.

REGULATION.—Low-water flow may be slightly affected by the operation of several small power plants above Salamanca. At Olean, N. Y., 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, but may be diverted into Oil Creek through a guard lock at the head of the canal.

ACCURACY.—Results fairly good below and good above 2,000 second-feet. Results for December only fair because of ice.

Discharge measurements of Allegheny River at Red House, N. Y., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 8	C. S. De Golyer	5.58	4,190	Sept. 2	C. S. De Golyer	4.09	1,290
May 23	C. C. Covert	5.70	4,580				

Daily discharge, in second-feet, of Allegheny River at Red House, N. Y., for year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	232	738	2,480	.....	4,770	6,690	1,310	1,460	1,310	685	1,940	685
2	205	905	3,090	.....	8,230	5,290	1,160	1,460	1,310	1,610	2,110	905
3	232	905	2,880	.....	8,230	4,270	1,460	1,380	1,240	2,880	3,780	1,100
4	205	738	2,580	.....	6,990	3,310	1,610	1,770	1,310	5,030	4,520	1,030
5	205	968	2,110	.....	5,830	2,480	2,110	2,580	1,160	4,770	4,020	905
6	260	738	1,460	.....	4,770	2,290	3,780	2,480	905	4,270	2,680	790
7	205	685	1,380	.....	4,270	2,480	3,780	2,290	905	3,780	2,200	790
8	232	905	1,690	10,600	4,270	2,880	4,270	3,540	790	4,020	1,770	790
9	260	968	1,460	14,100	4,770	2,110	5,290	2,880	738	13,300	2,380	685
10	232	738	1,310	10,600	4,270	1,540	6,990	2,680	585	11,000	2,110	685
11	260	685	1,160	9,950	4,270	1,770	8,230	2,380	635	8,230	1,770	490
12	292	905	.....	5,830	3,780	1,380	9,600	2,580	472	9,600	1,660	585
13	292	848	.....	3,780	4,770	1,310	8,900	2,110	418	8,900	968	585
14	400	1,160	.....	3,310	5,830	1,310	6,990	1,610	509	5,830	905	585
15	445	1,310	.....	4,020	11,400	1,540	5,830	1,310	490	5,830	905	509
16	362	1,540	.....	4,270	15,900	1,160	4,270	1,460	509	4,770	968	585
17	325	2,290	.....	5,830	13,300	1,310	3,310	2,580	635	4,270	1,030	538
18	362	1,940	.....	6,990	8,230	1,610	2,680	2,110	538	3,540	905	472
19	445	1,690	.....	5,560	6,110	1,380	2,480	1,770	509	2,880	968	490
20	400	1,610	.....	4,770	5,290	1,460	2,200	2,200	538	2,110	848	400
21	325	2,020	.....	4,520	4,520	1,860	1,770	2,110	490	1,940	685	509
22	490	1,610	.....	4,270	4,770	1,610	2,110	5,290	566	1,690	3,540	685
23	538	1,690	.....	3,310	5,830	1,770	1,690	4,020	509	1,460	5,290	709
24	445	1,770	.....	3,310	11,700	1,770	1,160	3,540	472	1,240	5,030	635
25	400	2,290	.....	3,310	18,800	1,770	905	3,540	490	1,380	4,770	685
26	585	2,110	.....	2,580	15,400	1,860	1,160	2,880	418	1,770	4,270	585
27	635	2,880	.....	2,110	12,500	1,770	1,610	2,580	385	2,110	2,290	585
28	738	3,780	.....	2,380	9,600	1,940	3,310	2,290	400	1,940	1,940	685
29	490	1,380	.....	2,110	.....	1,860	3,780	1,940	340	2,020	1,860	635
30	400	1,940	.....	1,690	.....	1,690	3,540	1,610	325	1,610	1,460	685
31	738	.....	.....	2,200	.....	1,610	.....	1,460	.....	2,290	790	.....

NOTE.—Discharge estimated, because of ice, by comparison of records of adjacent streams as follows: Dec. 12–31, 988 second-feet; Jan. 1–7, 1,440 second-feet.

Monthly discharge of Allegheny River at Red House, N. Y., for the year ending Sept. 30, 1915.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	738	205	375	0.229	0.26	B.
November	3,780	685	1,460	.890	.99	B.
December	.....	.....	1,330	.811	.94	C.
January	14,100	.....	4,240	2.59	2.99	B.
February	18,800	3,780	7,800	4.76	4.96	A.
March	6,690	1,160	2,160	1.32	1.52	A.
April	9,600	905	3,580	2.18	2.43	A.
May	5,290	1,310	2,380	1.45	1.67	A.
June	1,310	325	663	.404	.45	B.
July	13,300	685	4,090	2.49	2.87	A.
August	5,290	685	2,270	1.38	1.59	A.
September	1,100	400	667	.407	.45	B.
The year	18,800	205	2,550	1.55	21.12	

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 the Western Maryland Railroad. Stalnaker Run enters river on right about 1,000 feet below station and above the control.

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

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

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

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Stay wire is used for measurements at high stages. Flow of Stalanker 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, gage height 0.2 foot ±.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 8.6 feet at 7.30 a. m. June 14; minimum stage recorded, 0.85 foot at 7 a. m. and 7 p. m. September 17 and at 7.30 a. m. and 7.30 p. m. September 18. Highest known flood reached a stage represented approximately by gage height 16 feet.

WINTER FLOW.—No information available.

REGULATION.—None.

ACCURACY.—Records good.

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

Data insufficient for determination of daily discharge.

Discharge measurements of Tygart River near Dailey, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 19..	J. E. Stewart	1.74	135
Sept. 16.	B. J. Peterson	.90	17.7

Dailey gage height, in feet, of Tygart River near Dailey, W, Va., for the year ending Sept. 30, 1915.

Day.	Apr.	May	June	July	Aug.	Sept.	Day.	Apr.	May	June	July	Aug.	Sept.
1	.....	2.90	3.20	1.14	1.30	1.32	16	.....	1.39	3.78	1.02	1.88	.92
2	.....	2.45	2.60	1.21	1.09	1.38	17	.....	1.32	2.85	1.16	2.45	.85
3	.....	2.00	2.75	1.22	1.05	1.42	18	.....	1.28	2.40	1.60	2.20	.85
4	.....	2.06	3.10	1.14	1.12	1.52	19	.....	1.25	2.10	1.35	1.85	2.40
5	.....	1.92	2.75	1.20	1.10	1.48	20	1.64	1.25	1.85	1.28	1.45	2.20
6	.....	1.78	2.32	1.52	1.05	1.45	21	1.61	1.36	1.75	2.02	1.55	2.28
7	.....	1.65	2.05	1.26	1.00	1.26	22	1.56	1.75	1.68	1.88	1.40	2.28
8	.....	1.66	1.92	1.14	.95	1.22	23	1.78	2.26	1.54	1.65	1.55	1.95
9	.....	1.56	1.75	1.25	.92	1.30	24	2.00	2.22	1.38	1.45	1.42	1.58
10	.....	1.48	1.58	1.28	1.10	1.35	25	1.96	2.02	1.30	1.29	1.38	1.44
11	.....	1.38	1.48	1.25	.95	1.38	26	1.83	1.80	1.22	1.18	1.42	1.32
12	.....	1.42	1.44	1.18	1.10	1.50	27	1.72	1.82	1.18	1.22	1.52	1.29
13	.....	1.66	1.50	1.08	1.68	1.00	28	3.90	1.64	1.10	1.12	1.32	1.30
14	.....	1.54	7.00	1.00	1.60	.92	29	5.45	1.60	1.06	1.05	1.29	1.22
15	.....	1.46	6.76	1.25	2.18	.90	30	3.72	4.15	1.06	1.08	1.55	1.16
							31	.....	5.25	.....	1.45	1.48	.....

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, 1915.

GAGE.—Chain gage attached to the upstream side of highway bridge to left of center of the river; read daily, in the morning, to hundredths, by S. A. Campbell. Sea-level elevation of zero of gage, 1,679.89 feet.

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

CHANNEL AND CONTROL.—Practically permanent. Point of zero flow by leveling, August 22, 1910, at gage height about 1.6 feet; on November 6, 1913, this stage was found to be 1.4 feet ±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 11.8 feet at 7 a. m., February 2, 1915; minimum stage, 1.70 feet October 2, 1914. Flood of July, 1912, reached gage height, 20.3 feet.

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

ACCURACY.—Gage-height record reliable.

Estimates of discharge withheld for additional data.

The following discharge measurements were made by J. G. Mathers.

November 24, 1914: Gage height, 2.37 feet; discharge, 37 second-feet. Gage height, 2.34 feet; discharge, 34 second-feet.

Daily gage height, in feet, of Tygart River at Belington, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.89	2.48	2.24	5.2	5.6	4.15	3.8	5.2	6.0	2.35	2.71	3.22
2	1.70	2.49	2.36	4.4	11.8	4.0	3.65	4.6	4.3	2.14	2.71	3.00
3	1.93	2.48	2.84	4.25	11.8	3.8	3.55	4.0	4.2	2.43	3.22	2.84
4	1.94	2.44	3.00	4.4	8.7	3.7	3.48	3.75	4.2	2.21	3.31	2.55
5	1.95	2.35	3.22	3.5	6.3	3.55	3.40	3.6	4.3	2.31	2.80	2.58
6	1.85	2.29	3.95	3.30	5.5	4.3	3.30	3.45	3.8	2.43	3.65	2.69
7	2.04	2.26	3.9	7.0	5.2	4.35	3.46	3.30	3.6	2.36	2.51	2.64
8	1.91	2.25	3.95	9.9	4.8	4.2	4.2	3.22	3.41	2.75	2.50	2.68
9	1.91	2.27	4.15	5.9	4.8	4.35	4.0	3.14	3.30	2.50	2.44	2.71
10	1.95	2.25	4.4	5.2	4.05	4.15	3.8	3.10	3.12	3.49	2.59	2.57
11	1.98	2.14	4.4	4.2	3.85	4.2	3.9	3.00	2.95	3.14	3.42	2.51
12	1.98	2.25	3.9	5.4	4.0	4.2	4.1	2.95	2.90	3.50	2.49	2.36
13	1.95	2.19	3.9	6.2	4.0	4.0	4.4	3.9	2.86	3.49	2.50	2.41
14	2.01	2.18	3.85	5.0	3.95	3.85	4.2	3.6	2.84	3.47	3.09	2.35
15	2.12	2.30	3.8	5.0	3.50	3.40	4.05	3.39	6.8	2.35	3.02	2.31
16	2.43	2.32	3.65	7.0	5.7	3.7	3.85	3.26	6.0	2.33	2.82	2.26
17	2.45	2.46	3.6	7.2	5.4	3.9	3.7	3.19	4.5	2.35	3.25	2.21
18	2.45	2.58	3.20	10.6	4.7	3.95	3.40	3.05	3.85	3.20	5.4	2.20
19	2.47	2.51	3.20	10.6	4.2	3.85	3.40	2.95	3.55	3.05	3.95	2.58
20	2.45	2.51	4.15	8.0	3.09	3.75	3.35	2.95	2.95	2.90	2.25	4.35
21	2.43	2.44	7.4	5.7	2.84	3.7	3.44	2.96	3.10	2.80	3.10	3.7
22	2.37	2.18	10.5	4.7	2.09	3.6	3.20	2.99	3.00	2.80	3.00	4.6
23	2.27	2.18	6.0	4.3	3.05	3.55	3.16	2.96	2.95	3.05	3.01	3.8
24	2.26	2.19	4.6	4.25	3.43	3.50	3.7	2.81	2.79	2.88	3.30	3.33
25	2.26	2.40	4.2	5.2	4.35	3.50	3.7	2.46	2.69	2.75	3.09	3.10
26	2.26	2.33	4.6	5.1	5.0	3.7	3.65	3.41	2.55	2.64	3.02	2.64
27	2.35	2.31	4.2	4.7	4.05	4.6	3.50	3.24	2.52	2.52	2.95	2.50
28	2.56	2.29	4.0	4.25	4.1	3.46	3.6	3.30	2.45	3.40	2.82	2.70
29	2.41	2.28	4.35	4.05	.....	3.42	6.0	3.31	2.39	2.40	2.64	2.70
30	2.51	2.25	6.9	4.35	.....	4.05	6.6	3.40	2.35	2.48	2.31	2.65
31	2.48	.....	7.5	4.6	.....	3.9	.....	3.30	.....	2.61	3.55	.....

NOTE.—River frozen over Nov. 24 and Dec. 15–19.

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, 1915.

GAGE.—Chain gage attached to downstream side of highway bridge; read daily, morning and evening, to hundredths, 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, 15.75 feet at 5 p. m., December 21, 1914; discharge, 24,500 second-feet; minimum stage, 2.80 feet October 5–8, 1914; discharge 28 second-feet.

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

WINTER FLOW.—Ice probably does not affect discharge relation. It is said that riffle below gage usually remains open.

ACCURACY.—Results good except for extremely low stages.

The following discharge measurements were made by J. H. Morgan.

December 2, 1914: Gage height, 4.02 feet; discharge, 450 second-feet. Gage height, 4.06 feet; discharge, 488 second-feet.

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	32	120	200	5,810	12,200	710	1,450	4,290	10,300	127	127	1,030
2	30	105	410	3,530	21,700	898	1,300	2,970	4,480	120	120	701
3	30	105	552	2,610	22,600	898	1,100	1,930	2,970	120	552	586
4	32	138	603	1,450	16,400	854	920	1,930	2,270	117	1,530	527
5	29	155	1,690	1,100	7,750	876	854	1,450	2,610	138	790	440
6	28	155	2,970	920	5,430	854	810	1,030	2,440	155	463	395
7	28	155	2,970	10,900	4,860	2,440	780	975	1,610	141	303	380
8	28	155	2,610	12,400	3,910	3,340	1,100	790	1,160	138	233	341
9	36	155	2,790	7,160	3,150	2,790	1,300	1,160	920	148	410	322
10	39	155	3,150	4,670	2,440	2,610	1,160	865	760	152	760	315
11	34	155	3,150	2,610	1,930	2,270	975	656	656	141	418	285
12	33	155	2,970	8,530	1,770	2,100	1,030	544	578	182	285	267
13	33	148	2,790	11,700	1,450	1,930	1,770	603	503	173	291	222
14	39	138	1,850	5,810	2,440	1,610	2,270	519	552	148	367	244
15	36	138	1,450	6,000	3,530	1,380	1,610	710	3,720	134	471	255
16	50	120	1,450	10,500	5,050	1,300	1,450	821	3,340	191	354	164
17	45	120	975	6,970	5,240	1,160	1,160	674	1,930	267	332	255
18	50	138	730	14,300	4,670	1,160	1,030	586	1,100	244	1,160	1,030
19	96	138	1,160	16,200	4,100	1,230	920	535	692	410	898	4,290
20	114	267	10,700	11,300	1,610	1,160	790	471	519	463	810	1,610
21	105	267	19,300	9,310	1,300	1,100	730	448	455	348	692	2,970
22	105	255	18,800	5,620	1,100	1,100	770	854	402	255	586	3,530
23	96	211	8,920	3,340	975	1,100	876	2,270	341	233	542	2,180
24	90	178	3,720	3,150	674	1,030	1,930	1,770	267	211	638	1,300
25	127	155	3,150	4,860	920	1,030	2,180	1,380	200	182	674	865
26	138	155	2,270	5,240	920	920	1,610	1,300	186	211	770	638
27	114	155	1,530	4,100	790	1,770	1,160	1,030	173	211	692	552
28	127	155	975	3,340	730	2,270	5,430	920	148	191	620	471
29	120	155	975	2,790	.....	2,100	6,190	975	108	164	1,300	418
30	120	191	8,340	1,770	.....	2,020	6,380	3,150	367	155	1,160	367
31	120	.....	11,300	1,930	.....	1,850	.....	7,560	.....	141	1,100	.....

NOTE.—Discharge determined from a rating curve well defined between 100 and 23,000 second-feet and poorly defined below 100 second-feet.

Monthly discharge of Tygart River at Fetterman, W. Va., for the year ending Sept. 30, 1915.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	138	28	67.9	0.051	0.06	B.
November	267	105	160	.119	.13	A.
December	19,300	200	4,010	2.99	3.45	A.
January	16,200	920	6,130	4.57	5.27	A.
February	22,600	674	4,990	3.72	3.87	A.
March	3,340	710	1,540	1.15	1.33	A.
April	6,380	730	1,700	1.27	1.42	A.
May	7,560	448	1,460	1.09	1.26	A.
June	10,300	108	1,530	1.14	1.27	A.
July	463	117	194	.145	.17	A.
August	1,530	120	643	.480	.55	A.
September	4,290	164	898	.670	.75	A.
The year	22,600	28	1,930	1.44	19.53	

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

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

DRAINAGE AREA.—2,430 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 7 to September 30, 1915. The upper and lower gages at Lock 15 have been read daily, to tenths, at 8 a. m. under the direction of the Corps of Engineers, United States Army, since May 1, 1904.

GAGE.—Upper gage at lock. The upper section is 61.5 feet from face of right lock wall, directly opposite lower section which is set in recess in left lock wall just above upper gate. Read twice daily to hundredths 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 the station is the crest of the dam and is permanent. Point of zero flow, gage height 7.0 feet, the elevation of crest of dam. Leakage through lock and occasionally opening of the valves of lock may affect the stage at which zero flow would occur.

EXTREMES OF STAGE.—Maximum stage recorded since April 7, 1915, 11.11 feet at 2 p. m. September 19; minimum stage recorded, 7.23 feet at 6 p. m. July 4 (12 lockages during day).

Flood of 1888 reached a stage represented by gage height about 26 feet.

WINTER FLOW.—Discharge relation not affected by ice.

DIVERSIONS.—None.

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

ACCURACY.—Records good.

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

Data insufficient for determining daily discharge.

Discharge measurements of Monongahela River at Lock 15, Hoult, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 4	Stewart and Archibald.	8.46	2,130	Sept. 19	B. J. Peterson.....	10.92	11,100
Sept. 18	B. J. Peterson.....	7.59	[a]523	20	.....do.....	9.17	4,080

[a] Measurement made by wading on crest of dam.

Discharge measurements of leakage through upper gates, Lock 15, Monongahela River at Hoult, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height in feet.		Discharge.
		Upper gage.	Lower gage.	
				Sec.-ft.
May 6	J. E. Stewart.....	8.15	8.2	49
Sept. 20	B. J. Peterson.....	8.7	9.4	47
20	.....do.....	8.73	.....	51

Daily gage height, in feet, of Monongahela River at Lock 15, Hoult, W. Va., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	9.6	10.0	7.28	7.31	8.4	16	8.25	7.79	9.1	7.36	7.52	7.36
2	.....	9.0	9.2	7.29	7.45	8.07	17	8.1	7.74	8.55	7.45	7.52	7.41
3	.....	8.6	9.5	7.30	7.66	7.84	18	8.02	7.68	8.15	7.55	8.15	7.60
4	.....	8.45	9.8	7.28	8.65	7.70	19	7.98	7.62	7.84	7.46	8.4	10.3
5	.....	8.25	9.6	7.34	8.08	7.60	20	7.88	7.59	7.76	7.62	8.1	8.95
6	.....	8.15	8.95	7.33	7.68	7.56	21	7.80	7.58	7.63	7.64	7.85	9.0
7	7.83	8.02	8.55	7.32	7.54	7.75	22	7.78	8.35	7.56	7.55	7.70	9.5
8	7.82	7.94	8.3	7.36	7.46	7.72	23	7.85	9.7	7.47	7.44	7.66	9.1
9	7.67	7.88	8.1	7.38	7.61	7.92	24	8.55	8.8	7.47	7.48	7.72	8.45
10	7.80	7.82	7.96	7.38	7.66	7.90	25	8.75	8.5	7.42	7.44	7.89	8.08
11	7.98	7.72	7.80	7.33	7.54	7.75	26	8.5	8.2	7.38	7.38	7.99	7.86
12	8.01	7.69	7.80	7.30	7.46	7.63	27	8.3	8.1	7.30	7.34	7.85	7.78
13	8.3	7.68	7.76	7.34	7.54	7.52	28	9.6	8.02	7.28	7.30	7.82	7.70
14	8.4	7.74	7.71	7.36	7.54	7.42	29	10.6	8.15	7.26	7.30	8.2	7.62
15	8.35	7.88	8.95	7.32	7.44	7.39	30	10.1	10.0	7.28	7.26	8.35	7.58
							31	.....	10.4	.....	7.26	8.65	.....

MONONGAHELA RIVER AT MORGANTOWN, W. VA.

LOCATION.—At highway bridge at foot of Pleasant Street, in Morgantown, Monongalia County, about 300 feet from Baltimore & Ohio Railroad station and about half a mile below lock No. 10.

DRAINAGE AREA.—2,670 square miles.

RECORDS AVAILABLE.—April 1, 1914, to September 30, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, by John Seaman.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Dam No. 9 forms the control.

EXTREMES OF STAGE.—Maximum stage recorded during year, 16.6 feet at 9.20 a. m. December 22; minimum stage, 2.61 feet at 7.35 a. m. October 8.

DIVERSONS.—The city of Morgantown obtains its water supply from a point above dam No. 8.

REGULATION.—The river is regulated by locks and dams in the interest of navigation.

ACCURACY.—Gage-height record reliable.

Data insufficient for estimates of discharge.

No discharge measurements were made at this station during the year.

Daily gage height, in feet, of Monongahela River at Morgantown, W. Va., for the year ending Sept. 30, 1015.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.82	3.14	3.31	8.0	10.2	4.8	4.5	7.5	7.2	3.36	3.20	4.7
2	2.84	3.13	3.75	7.3	15.6	4.7	4.3	6.6	5.9	3.44	3.22	4.5
3	2.84	3.18	4.0	6.3	15.4	4.7	4.3	6.0	5.7	3.6	3.22	4.1
4	2.78	3.24	4.1	5.6	13.9	4.7	4.2	5.8	6.3	3.7	4.1	4.05
5	2.72	3.22	6.5	5.4	11.8	4.7	4.15	5.8	6.1	3.55	4.5	3.8
6	2.66	3.20	9.2	5.6	11.3	4.9	4.05	5.6	5.4	3.39	4.5	3.7
7	2.63	3.12	7.3	9.4	11.0	5.6	4.0	5.5	4.8	3.34	4.3	3.7
8	2.82	3.12	6.1	12.0	9.3	6.0	3.9	5.3	4.5	3.34	3.95	3.7
9	2.94	3.12	6.6	11.7	8.4	6.0	3.9	5.0	4.3	3.34	3.95	3.7
10	2.92	3.12	6.3	10.8	7.4	6.0	4.0	4.7	4.1	3.31	3.95	3.7
11	3.06	3.13	6.4	10.4	6.2	5.3	4.15	4.4	4.0	3.30	3.8	3.7
12	3.06	3.12	5.9	11.5	5.1	5.1	4.3	4.35	4.2	3.29	3.7	3.7
13	3.08	3.12	5.4	13.2	5.2	5.1	4.3	4.45	3.95	3.28	3.7	3.7
14	3.06	3.13	5.5	13.0	4.9	4.7	4.6	4.2	3.9	3.25	3.75	3.5
15	3.06	3.16	5.5	12.9	4.8	4.6	4.5	3.95	3.9	3.24	3.55	3.32
16	3.14	3.18	5.5	12.8	4.6	4.7	4.45	3.85	5.3	3.23	3.39	3.30
17	3.14	3.18	5.5	12.8	4.2	4.6	4.4	3.85	4.9	3.28	3.45	3.30
18	3.28	3.18	5.5	12.8	4.2	4.4	4.35	3.85	4.4	3.30	3.48	3.30
19	3.26	3.18	5.6	12.8	4.2	4.4	4.15	3.85	4.1	3.26	3.75	4.4
20	3.21	3.18	5.8	12.7	4.2	4.5	4.1	3.8	3.85	3.26	4.15	6.8
21	3.18	3.40	10.0	11.5	4.2	4.5	4.0	4.0	3.8	3.24	4.35	6.9
22	3.18	3.31	16.4	10.9	4.6	4.4	4.0	4.9	3.65	3.22	4.5	6.8
23	3.14	3.32	14.2	11.2	4.45	4.4	4.1	5.9	3.6	3.22	4.6	6.7
24	3.12	3.33	10.8	10.2	4.4	4.5	4.2	5.6	3.5	3.22	4.6	6.7
25	3.12	3.34	9.9	9.9	4.4	4.45	4.8	5.0	3.46	3.21	4.6	6.7
26	3.11	3.23	9.8	8.5	4.6	4.6	5.2	4.6	3.44	3.20	4.6	6.7
27	3.12	3.24	4.6	7.7	4.9	4.8	5.0	4.25	3.44	3.20	4.6	6.7
28	3.13	3.22	4.4	4.0	4.9	5.0	5.7	4.3	3 34	3.20	4.6	6.7
29	3.14	3.24	5.5	3.9	.....	5.0	7.9	4.25	3.32	3.20	4.6	3.7
30	3.12	3.24	6.5	3.7	.....	4.7	7.9	6.6	3.33	3.20	4.7	3.7
31	3.12	.....	8.7	3.55	.....	4.6	.....	7.9	.....	3.20	4.7	.....

MIDDLE FORK RIVER AT MIDVALE, W. VA.

LOCATION.—About one-third mile above Midvale railroad 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 to September 30, 1915.

GAGE.—Vertical and inclined staff on right bank; read twice daily, to hundredths, 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 $+0.55 \pm 0.1$ foot.

EXTREMES OF STAGE.—Maximum stage recorded, 7.3 feet at 7.30 a. m. July 29; minimum stage recorded, 1.30 feet at 7 a. m. July 28.

Floods of 1888 and 1912 reached gage height of approximately 18 feet.

WINTER FLOW.—No information available.

REGULATION.—None.

ACCURACY.—Records good.

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

Data insufficient for determining daily discharge.

Discharge measurements of Middle Fork River at Midvale, W. Va., during the year ending Sept. 30, 1015.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 30	Stewart and Archibald	3.82	512
May 2	J. E. Stewart	3.02	272
Sept. 15	B. J. Peterson	1.66	35.4

Daily gage height, in feet, of Middle Fork River at Midvale, W. Va., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	3.3	1.42	1.78	2.1	16	2.1	2.9	1.40	1.51	1.52
2	.....	3.1	1.56	1.63	1.88	17	2.05	2.5	1.64	2.05	1.44
3	2.75	3.3	1.47	1.68	1.82	18	2.0	2.25	1.82	2.6	1.42
4	2.6	3.4	1.54	1.62	1.85	19	1.95	2.05	1.70	2.2	1.88
5	2.5	3.1	1.52	1.52	1.84	20	1.95	1.9	1.57	1.9	2.3
6	2.4	2.65	1.59	1.44	1.76	21	2.05	1.82	1.68	1.84	2.85
7	2.25	2.45	1.52	1.41	1.69	22	2.2	1.86	1.68	1.86	2.8
8	2.25	2.35	1.44	1.39	1.84	23	2.35	1.76	1.60	2.1	2.3
9	2.1	2.1	1.60	1.56	1.78	24	2.3	1.66	1.52	2.05	2.05
10	2.05	2.0	1.62	1.72	1.72	25	2.3	1.60	1.48	2.0	1.9
11	1.95	1.9	1.53	1.55	1.62	26	2.25	1.52	1.46	1.95	1.79
12	2.0	1.95	1.70	1.50	1.56	27	2.4	1.50	1.38	1.82	1.82
13	2.3	1.78	1.62	1.58	1.54	28	2.25	1.73	1.32	1.9	1.78
14	2.2	5.6	1.52	1.56	1.54	29	2.4	1.64	4.4	2.15	1.68
15	2.15	3.6	1.41	1.54	1.66	30	2.5	1.65	1.53	2.25	1.64
						31	4.1	.....	2.05	2.2	.....

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 to September 30, 1915. June 7, 1907, to May 25, 1909, chain gage at county highway bridge.

GAGE.—Vertical and inclined staff on right bank; read twice daily, to hundredths, 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 do not overflow except into an old mill race on left bank.

EXTREMES OF STAGE.—Maximum stage recorded since April 15, 6 feet at 6 a. m. April 28; minimum stage recorded, 1.92 feet at 6 p. m. July 1 and 6 a. m. July 2.

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

WINTER FLOW.—No information available.

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

REGULATION.—None.

ACCURACY.—Records good.

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

Data insufficient for determining daily discharge.

Discharge measurements of Buckhannon River at Hall, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 13	J. E. Stewart	[a] 3.00	501
24	do	3.15	630
Sept. 16	B. J. Peterson	2.20	72.8

[a] New inclined gage; first measurement at new site.

Daily gage height, in feet, of Buckhannon River at Hall, W. Va., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	3.5	3.4	1.93	2.78	2.80	16	2.85	2.36	2.69	2.03	2.13	2.22
2	.....	3.1	3.15	1.94	2.47	2.62	17	2.82	2.32	2.64	2.07	2.21	2.14
3	.....	2.94	3.3	1.99	2.92	2.50	18	2.71	2.30	2.52	2.57	2.64	2.12
4	.....	2.82	4.3	2.11	2.75	2.46	19	2.61	2.24	2.41	2.75	2.78	2.36
5	.....	2.74	3.65	2.12	2.44	2.55	20	2.56	2.24	2.32	2.49	2.63	3.15
6	.....	2.65	3.2	2.14	2.27	2.59	21	2.52	2.29	2.26	2.36	2.42	3.4
7	.....	2.59	2.96	2.16	2.16	2.50	22	2.56	2.36	2.23	2.47	2.38	3.65
8	.....	2.56	2.82	2.15	2.13	2.60	23	2.84	2.48	2.26	2.42	2.42	3.1
9	.....	2.52	2.72	2.09	2.18	2.64	24	3.15	2.62	2.22	2.32	2.66	2.85
10	.....	2.44	2.59	2.10	2.54	2.51	25	2.98	2.64	2.14	2.24	2.56	2.68
11	.....	2.38	2.48	2.17	2.40	2.45	26	2.86	2.56	2.07	2.16	2.65	2.55
12	.....	2.35	2.43	2.11	2.28	2.36	27	2.79	2.55	2.03	2.11	2.57	2.48
13	.....	2.42	2.44	2.13	2.13	2.26	28	5.7	2.61	1.99	2.04	2.68	2.44
14	.....	2.49	2.40	2.17	2.19	2.25	29	4.3	2.59	1.97	2.06	3.0	2.44
15	2.92	2.44	2.46	2.08	2.21	2.26	30	4.1	2.92	1.96	2.14	3.15	2.33
							31	.....	3.9	.....	2.59	3.10	.....

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 to September 30, 1915.

GAGE.—Chain gage fastened to upstream side of trolley bridge near center of span; read twice daily, to hundredths, by Bessie Irwin.

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 causes backwater at gage during summer months.

EXTREMES OF STAGE.—Maximum stage recorded, 12.4 feet at 9.30 a. m. August 3; minimum stage recorded, 3.52 feet at 9.30 a. m. June 30.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—Low-water flow affected by operation of power plants and storage reservoirs at and above Weston.

ACCURACY.—Records fair. See "Channel and control" and "Regulation."

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

Data inadequate for determining daily discharge.

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

Date.	Made by—	Gage height.	Discharge.
		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

Daily gage height, in feet, of West Fork River at Butcherville, W. Va., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	6.07	5.36	3.56	4.91	5.16	16	4.62	4.49	4.40	3.83	4.32	4.71
2	.....	5.30	5.04	3.64	4.46	4.86	17	4.61	4.34	4.41	4.71	4.48	4.38
3	.....	5.10	7.88	3.64	10.76	4.74	18	4.57	4.23	4.34	4.80	5.78	4.30
4	.....	4.95	7.82	3.73	5.99	5.00	19	4.52	4.15	4.29	4.44	5.79	6.00
5	.....	4.94	6.35	3.86	4.84	6.14	20	4.48	4.12	4.23	4.15	5.02	5.75
6	.....	4.80	5.50	3.86	4.68	5.60	21	4.48	4.26	4.08	4.02	4.73	9.22
7	.....	4.72	5.10	3.84	4.52	5.51	22	4.45	4.41	3.98	4.02	4.82	7.22
8	4.40	4.60	4.66	3.82	4.61	8.04	23	7.38	4.90	3.86	4.02	4.91	5.85
9	4.37	4.58	4.72	3.82	5.52	6.58	24	6.06	5.00	3.75	3.91	4.94	5.24
10	4.34	4.52	4.66	3.89	5.18	5.54	25	5.46	4.70	3.71	3.71	5.19	4.93
11	4.39	4.44	4.37	4.04	4.80	5.18	26	5.08	4.62	4.15	3.70	4.80	4.72
12	4.48	4.40	4.38	4.06	4.64	4.49	27	5.44	4.60	4.70	3.74	4.71	4.65
13	4.84	4.66	4.36	3.93	5.12	4.66	28	8.86	4.52	3.66	3.68	4.63	4.64
14	4.88	4.62	4.31	3.82	4.72	5.14	29	7.18	4.56	3.59	3.85	4.97	4.52
15	4.72	4.52	4.60	3.72	4.48	5.19	30	6.55	4.85	3.53	4.59	6.00	4.44
							31	.....	5.76	.....	5.48	5.74	.....

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, in the morning, to hundredths, 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. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.0 feet at 8 a. m., January 7 (discharge, 18,200 second-feet); minimum stage, 0.95 foot at 8 a. m., October 3, 4, 6, 7, 10, 11, and 12 (discharge, 28 second-feet).

1907–1915: Maximum stage recorded, 18.8 feet at 8 a. m., November 16, 1913 (discharge, approximately 19,400 second-feet). Flood of 1888 reached stage represented by about 33 feet referred to datum of present gage.

WINTER FLOW.—Ice may affect the discharge relation for two or three weeks at a time during December, January, and February.

ACCURACY.—Accuracy of estimates in the following tables depends on permanence of the discharge relation subsequent to 1913.

Discharge measurements of West Fork River at Enterprise, W. Va., during the year ending Sept. 30, 1915.

[Made by J. H. Morgan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 23[a]	1.83	56.2
23[a]	1.83	55.1

[a] River frozen over below gage.

Daily discharge, in second-feet, of West Fork River at Enterprise, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	33	155	266	1,530	8,400	649	307	1,090	678	40	85	621
2	33	140	566	1,090	9,650	566	307	707	593	48	172	395
3	28	140	829	3,990	8,160	465	307	395	1,090	52	140	208
4	28	124	514	593	7,430	395	286	286	2,750	52	2,090	172
5	33	140	3,670	418	3,990	328	266	246	1,920	208	418	190
6	28	146	2,840	441	2,270	959	227	227	1,090	99	227	155
7	28	172	2,010	11,200	2,360	1,160	190	208	540	52	124	227
8	33	136	2,270	4,200	1,760	1,530	172	190	372	52	112	372
9	32	140	3,250	2,270	1,160	1,230	155	197	286	52	89	1,090
10	28	155	2,550	4,310	959	1,030	140	155	208	64	72	707
11	28	140	2,010	829	861	861	678	155	140	49	227	372
12	28	124	1,450	10,900	861	1,300	172	124	190	58	172	246
13	33	172	1,300	10,300	893	540	621	155	190	52	140	172
14	48	124	893	3,880	798	489	227	155	190	64	112	155
15	48	112	829	2,550	959	441	208	190	155	52	72	143
16	72	89	829	3,780	2,180	418	172	155	172	72	124	112
17	112	93	798	2,180	1,840	372	190	112	286	140	124	99
18	79	89	707	2,950	1,160	328	140	140	208	64	140	64
19	140	99	649	4,630	707	328	155	112	112	112	140	418
20	89	89	893	2,360	649	307	155	124	227	155	127	1,090
21	72	58	8,040	2,010	566	286	140	172	227	140	140	678
22	48	.....	7,910	1,090	465	540	124	266	227	99	102	372
23	72	.....	2,360	1,160	395	678	140	2,090	208	72	140	208
24	89	.....	2,010	1,030	372	621	992	737	172	64	140	286
25	79	.....	1,760	2,750	441	649	767	707	140	62	307	328
26	172	.....	1,530	4,200	489	621	441	328	112	48	328	208
27	146	.....	1,530	2,750	593	767	395	227	79	48	246	190
28	112	.....	1,380	1,760	566	707	286	227	40	40	227	172
29	112	.....	2,750	1,030	.....	566	2,550	208	30	43	208	992
30	112	112	5,860	926	.....	480	1,230	441	36	79	328	767
31	140	.....	4,200	4,420	.....	395	.....	1,090	.....	89	350	.....

NOTE.—Discharge determined from a rating curve well defined below 2,180 second-feet and fairly well defined between 2,180 and 6,460 second-feet. Discharge, Nov. 22–29, estimated, because of ice, at 60 second-feet.

Monthly discharge of West Fork River at Enterprise, W. Va., for the year ending Sept. 30, 1915.

[Drainage area, 750 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	172	28	68.9	0.092	0.11	B.
November	172	.....	108	.144	.16	B.
December	8,040	266	2,210	2.95	3.40	B.
January	11,200	418	3,150	4.20	4.84	B.
February	9,650	372	2,180	2.91	3.03	B.
March	1,530	286	645	.860	.99	B.
April	2,550	124	405	.540	.60	B.
May	2,090	112	375	.500	.58	B.
June	2,750	30	422	.563	.63	B.
July	208	40	74.9	.100	.12	B.
August	2,090	72	239	.319	.37	B.
September	1,090	64	374	.499	.56	B.
The year	11,200	28	848	1.13	15.39	

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, 1915.

GAGE.—Wooden staff gage fastened to a tree near right abutment of footbridge; read daily, in the morning, to half tenths, 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 this report refer to the new datum. Sea-level elevation of zero of gage, 955.01 feet.

DISCHARGE MEASUREMENTS.—Made from footbridge at high stages; low water, by wading at section about 200 feet below bridge.

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

EXTREMES OF STAGE.—Maximum stage recorded during year, 6.9 feet at 9.30 a. m. January 12; minimum stage recorded, 1.05 feet at 7 a. m. October 1 to 3, 6 to 13, 1914, and July 28 and 29, 1915.

The flood of July, 1912, reached stage represented by 15 feet on the present gage.

WINTER FLOW.—Discharge relation may be affected by ice for short periods in December, January, and February.

ACCURACY.—Gage-height record reliable.

Data inadequate for estimates of discharge.

The following discharge measurements were made by wading, by J. H. Morgan:

November 21, 1914: Gage height, 1.40 feet; discharge, 4.7 second-feet. Gage height, 1.39 feet; discharge, 4.3 second-feet. River was frozen over at gage; open at control.

Daily gage height, in feet, of Elk Creek near Clarksburg, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.05	1.3	1.35	2.55	4.9	2.1	1.85	2.3	1.8	1.1	1.5	2.05
2	1.05	1.3	1.9	2.4	4.5	1.9	1.8	2.1	1.7	1.25	1.45	1.85
3	1.05	1.3	2.0	2.25	5.5	2.0	1.75	1.95	2.1	1.25	1.6	1.65
4	1.1	1.3	1.85	2.0	3.7	1.9	1.75	1.9	2.5	1.3	1.95	1.55
5	1.1	1.3	2.9	2.0	3.0	1.85	1.7	1.8	2.2	1.3	1.55	1.65
6	1.05	1.3	2.0	1.9	2.9	2.8	1.7	1.8	1.9	1.25	1.5	1.55
7	1.05	1.3	2.3	6.8	2.9	2.8	1.65	1.7	1.8	1.25	1.35	1.55
8	1.05	1.3	3.1	3.4	2.6	2.65	1.65	1.7	1.75	1.2	1.35	1.5
9	1.05	1.3	3.0	2.7	2.45	2.5	1.6	1.7	1.7	1.2	2.15	1.5
10	1.05	1.3	2.9	2.35	2.3	2.45	1.9	1.6	1.65	1.15	1.8	1.6
11	1.05	1.3	2.8	2.2	2.3	2.35	1.6	1.55	1.55	1.15	1.65	1.5
12	1.05	1.3	2.5	6.9	2.2	2.2	1.7	1.55	1.6	1.2	1.45	1.55
13	1.05	1.3	2.3	4.1	2.2	2.1	1.7	1.8	1.6	1.35	1.6	1.4
14	1.1	1.3	2.3	3.1	2.3	2.0	1.7	1.7	1.55	1.35	1.4	1.35
15	1.1	1.3	2.1	3.3	2.35	1.95	1.65	1.6	1.55	1.25	1.35	1.7
16	1.15	1.35	2.3	3.3	3.0	1.9	1.6	1.55	1.7	1.4	1.35	1.55
17	1.15	1.35	2.1	2.85	2.6	1.9	1.6	1.5	1.6	1.4	1.25	1.5
18	1.15	1.35	1.9	3.1	2.4	1.85	1.6	1.5	1.5	1.35	1.6	1.5
19	1.2	1.45	1.9	3.8	2.2	1.8	1.6	1.5	1.4	1.35	1.5	4.25
20	1.25	1.55	5.1	3.1	2.1	1.9	1.55	1.5	1.4	1.3	1.45	2.6
21	1.25	1.55	6.15	2.65	2.0	2.0	1.55	1.6	1.45	1.25	1.45	2.15
22	1.25	1.35	3.9	2.3	1.9	2.1	1.55	1.7	1.3	1.3	1.35	2.55
23	1.2	1.35	2.95	2.75	1.9	2.2	1.6	2.25	1.3	1.2	1.45	2.15
24	1.3	1.3	2.4	3.1	1.9	2.2	2.3	2.0	1.2	1.2	1.35	1.85
25	1.3	1.3	2.3	3.5	2.1	2.15	2.0	1.8	1.3	1.15	1.75	1.75
26	1.3	1.25	2.2	3.4	2.15	2.2	1.9	1.7	1.3	1.1	1.9	1.7
27	1.3	1.25	1.9	2.9	2.1	2.1	1.8	1.7	1.15	1.15	1.65	1.65
28	1.3	1.25	1.8	2.6	2.15	2.0	5.4	1.65	1.15	1.05	1.6	1.55
29	1.3	1.2	1.9	2.3	.....	2.0	3.3	1.65	1.1	1.05	1.95	1.55
30	1.3	1.25	4.5	2.4	.....	1.95	2.7	1.9	1.15	1.25	3.35	1.55
31	1.3	.....	3.1	2.2	.....	1.9	.....	2.0	.....	1.3	2.5	.....

NOTE.—River frozen Nov. 19–21, Dec. 15–19, Jan. 3–6, 30, 31, and Feb. 10.

BUFFALO CREEK AT BARRACKVILLE, W. VA.

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

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

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

GAGE.—Chain gage fastened to downstream hand rail of bridge; read to hundredths twice week days and once Sundays 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. Point of zero flow, gage height 0.4±0.1.

EXTREMES OF STAGE.—Maximum stage recorded since May 8, 6.1 feet at 8.45 a. m. May 30; minimum stage recorded, 0.63 feet at 11.15 a. m. July 28.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Buffalo Creek at Barrackville, W. Va., during the year ending Sept. 30, 1915, and one in 1913.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1913.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Mar. 29	G. C. Stevens	2.70	272	May 22	J. E. Stewart	3.43	490
				22	do	4.88	1,240
1915.				23	do	4.01	785
May 7	J. E. Stewart	1.36	48.5	23	do	3.84	702
21	do	1.03	13.0	Sept. 17	B. J. Peterson	.96	6.5

Daily gage height, in feet, of Buffalo Creek at Barrackville, W. Va., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day	May	June.	July.	Aug.	Sept.
1		2.3	0.80	0.63	1.02	16	1.10	1.43	0.95	0.75	0.91
2		1.95	.82	.65	.95	17	1.10	1.30	.97	.77	.90
3		2.95	.86	.84	.89	18	1.06	1.19	.93	.74	.98
4		2.45	.91	.85	.86	19	.96	1.11	.90	.77	2.1
5		1.9	1.06	.79	.84	20	.98	1.06	.82	.82	1.54
6		1.60	1.22	.77	.79	21	1.02	1.04	.78	.83	1.32
7			1.08	.73	.78	22	2.6	1.00	.76	.81	1.22
8	1.36	1.45	1.07	1.03	.76	23	3.5	.96	.70	.79	1.11
9	1.32	1.33	1.08	.99	.76	24	2.3	.90	.68	.78	1.02
10	1.22	1.24	1.07	1.07	.82	25	1.8	.84	.67	.95	.95
11	1.14	1.15	.98	.91	1.05	26	1.56	.82	.66	.92	.92
12	1.14	1.54	.98	.90	1.10	27	1.60	.88	.66	.89	.94
13	1.27	1.34	.91	.93	1.08	28	1.40	.81	.64	1.06	.91
14	1.21	1.40	.87	.87	1.05	29	2.4	.78	.71	1.14	.97
15	1.13	1.37	.83	.82	.96	30	5.9	.80	.74	1.16	.94
						31	3.8		.67	1.06	

DECKERS CREEK AT MORGANTOWN, W. VA.

LOCATION.—At Peninsula Bridge, about a mile east of the Baltimore & Ohio Railroad station in Morgantown, Monongalia County, and 1¼ miles upstream from the Valley Crossing highway bridge.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 4, 1914, to September 30, 1915. April 1 to December 3, 1914, at station at the Valley Crossing highway bridge, one-fourth mile downstream.

GAGE.—Chain gage attached to downstream side of bridge; read daily, morning and evening, to hundredths; by J. S. Seaman.

DISCHARGE MEASUREMENTS.—At low and medium stages made by wading about 700 feet below gage; at high stages measurements will be made at the bridge to which gage is attached.

CHANNEL AND CONTROL.—Probably permanent. Point of zero flow, gage height 0.0±0.1.

EXTREMES OF STAGE.—Maximum stage recorded during year, 7.8 feet at 4.45 p. m. February 2; minimum stage, 0.31 foot at 4.35 p. m. August 16.

ACCURACY.—Gage-height record reliable.

Data inadequate for estimates of discharge.

Discharge measurements of Deckers Creek, at Morgantown, W. Va., during the year ending Sept. 30, 1915.

[Made by J. H. Morgan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 27	[a]3.32	6.3
Dec. 4	[b].85	41.6

[a] Gage height at old gage site. [b] Gage height at new gage.

Daily gage height, in feet, of Deckers Creek, at Morgantown, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.77	3.21	3.34	4.18	4.98	0.92	1.16	2.42	2.28	0.50	0.36	0.59
2	2.62	3.04	3.62	3.02	6.63	.88	1.11	1.58	1.95	.69	.36	.56
3	2.60	3.06	3.59	1.72	7.63	.84	1.04	1.12	1.90	.75	.42	.52
4	2.58	3.09	.84	1.35	5.66	.82	.84	1.03	1.80	.72	.50	.52
5	2.62	3.12	2.66	1.21	3.93	.85	.81	1.09	1.24	.68	.48	.56
6	2.51	3.14	3.24	1.24	4.44	1.22	.80	1.06	1.09	.64	.44	.56
7	3.04	3.12	2.32	3.50	3.85	1.46	.69	1.04	1.08	.60	.40	.56
8	3.48	3.12	2.10	3.30	3.30	2.10	.64	1.02	.92	.62	.38	.54
9	3.16	3.12	1.76	3.22	2.49	2.00	.60	.92	.84	.64	.38	.53
10	3.02	3.14	2.00	3.18	2.00	1.95	.62	.82	.80	.62	.37	.52
11	3.29	3.14	1.84	2.98	1.78	1.82	.78	.78	.71	.54	.36	.52
12	3.24	3.14	1.58	3.90	1.36	1.86	.96	.81	.77	.50	.35	.51
13	3.26	3.12	1.35	3.97	2.50	1.92	.98	.88	.79	.49	.35	.50
14	3.34	3.14	1.40	3.75	1.96	1.14	.97	.76	.76	.46	.34	.50
15	3.30	3.11	1.42	3.67	1.59	1.10	.94	.70	.74	.44	.32	.50
16	3.34	3.12	1.63	3.33	1.10	1.19	.88	.67	.75	.44	.31	.49
17	3.32	3.12	1.84	3.36	1.10	1.10	.85	.73	.68	.48	.37	.48
18	3.28	3.12	1.86	3.93	1.00	1.00	.82	.82	.58	.45	.40	.49
19	3.26	3.14	1.90	3.90	1.00	1.02	.77	.77	.58	.44	.40	.65
20	3.24	3.21	2.08	3.82	.98	1.24	.74	.74	.50	.42	.40	2.98
21	3.20	3.32	5.14	3.66	.94	1.02	.72	.86	.52	.40	.42	3.35
22	3.20	3.28	6.16	2.96	.99	.91	.70	3.46	.50	.40	.48	3.35
23	3.12	3.22	3.40	3.32	.94	.96	1.16	4.09	.52	.38	.48	3.34
24	3.17	3.24	1.30	2.91	.99	.99	1.25	3.31	.48	.37	.47	3.34
25	3.30	3.26	1.28	2.82	1.16	.83	1.20	2.04	.44	.36	.46	3.30
26	3.34	3.30	1.28	2.46	1.18	.94	1.30	1.44	.42	.36	.46	3.24
27	3.36	3.30	1.56	2.28	1.16	.99	1.20	1.31	.41	.34	.44	3.22
28	3.36	3.34	1.91	2.27	.99	1.22	2.14	1.14	.40	.34	.44	3.10
29	3.36	3.34	3.11	2.04	.....	1.30	3.42	1.24	.34	.33	.55	.54
30	3.36	3.34	3.07	1.96	.....	1.24	3.02	3.40	.38	.32	.64	.55
31	3.38	.....	3.58	2.46	.....	1.16	.....	3.38	.....	.34	.62	.....

NOTE.—Gage heights Oct. 1 to Dec. 3 refer to gage at Valley Crossing highway bridge; gage heights subsequent to Dec. 3 refer to gage at Peninsula Bridge.

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, 1915.

GAGE.—Chain gage near center of bridge on downstream guard rail; read twice a day, to quarter-tenths, by Mrs. E. C. Linger.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.0 feet at 7 a. m. January 7 (discharge, 24,700 second-feet); minimum stage, 1.6 [feet at 6 p. m. November 11 (discharge, 60 second-feet).

WINTER FLOW.—Discharge relation affected by ice during severe winters.

DIVERSIONS.—None.

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.—Gage height records are reliable; the channel is fairly permanent, but the measuring section is poor. The results are believed to be reliable.

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

The following discharge measurement was made by J. G. Mathers: November 25, 1914: Gage height, 2.25 feet; discharge, 217 second-feet.

Daily discharge, in second-feet, of Cheat River near Parsons, W. Va., for the years ending Sept. 30, 1913–1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913.												
1				2,350	1,890	2,040	2,190		1,290	618	910	235
2				2,040	1,600	1,600	1,740		1,180	618	618	195
3				4,500	1,670	1,410			1,120	545	545	195
4				3,560	3,560	1,290			1,010	655	415	160
5				4,500	2,840	1,180			865	735	330	160
6				6,290	1,890	960			865	1,010	358	160
7				8,040	1,350	960			1,350	865	280	235
8				15,300	820	820			1,670	580	305	415
9				8,790	695	820			1,350	545	258	385
10				4,500	820	1,410			1,010	9,050	235	258
11				3,380	2,040	3,740			865	4,300	478	215
12				6,290	2,840	3,740			655	1,670	695	178
13				4,910	1,740	4,110			545	2,350	7,540	145
14				3,020	1,180	7,290			510	4,910	4,300	145
15				2,190	865	6,290			478	3,740	1,740	145
16				2,040	735	4,110			415	1,740	1,060	130
17				2,670	1,010	2,670			358	4,110	695	160
18				2,350	1,470	2,350			280	4,500	580	910
19				2,040	2,350	2,350			215	2,350	580	695
20				1,740	2,670	2,350			195	1,290	580	478
21				1,600	3,020	2,040			215	1,060	358	4,500
22				2,040	2,840	1,670			385	910	358	3,740
23				2,040	2,190	1,410			1,180	865	1,740	3,380
24				3,380	1,410	1,410			1,540	778	2,040	2,190
25				3,740	1,180	1,290			1,600	1,120	1,410	1,230
26				2,510	1,010	1,600			2,350	960	820	545
27				2,190	865	10,400			1,670	618	478	385
28				1,740	2,040	7,290			1,180	580	358	330
29				1,470		3,920			910	865	280	330
30				1,120		3,200			778	580	280	305
31				1,890		2,350				1,230	235	

Daily discharge, in second-feet, of Cheat River near Parsons, W. Va., for the years ending Sept. 30, 1913–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	305	1,120	960	1,010	6,790	960	4,110	.....	.....	258	545	415
2	385	910	865	910	4,110	655	10,600	.....	.....	258	385	330
3	3,020	778	865	820	2,350	580	8,290	.....	.....	235	330	305
4	2,350	695	778	695	2,040	695	4,500	.....	.....	215	358	235
5	1,180	618	695	695	1,740	735	3,200	.....	.....	1,600	280	195
6	820	655	960	695	1,740	820	2,350	.....	.....	820	258	178
7	695	545	4,500	618	2,510	695	2,040	.....	.....	580	215	160
8	580	580	4,910	695	2,190	618	4,500	.....	.....	445	195	178
9	1,410	2,840	2,350	.....	1,740	510	4,910	.....	.....	305	215	160
10	3,380	2,350	1,740	.....	1,600	580	3,020	.....	.....	330	330	145
11	2,040	1,740	1,350	.....	1,350	695	.....	.....	.....	215	358	145
12	1,470	1,740	1,180	.....	1,010	655	.....	.....	.....	215	655	178
13	1,230	4,500	1,060	.....	865	580	.....	.....	.....	215	1,010	178
14	910	16,500	1,060	.....	735	510	.....	.....	.....	280	618	145
15	778	15,300	960	.....	580	1,290	.....	.....	.....	4,700	415	160
16	695	22,900	910	.....	618	3,560	.....	.....	.....	4,500	330	130
17	618	21,400	865	.....	655	6,790	.....	.....	.....	2,190	258	118
18	910	9,310	865	.....	820	5,350	.....	.....	.....	1,410	215	95
19	1,350	3,740	778	.....	9,310	3,020	.....	.....	.....	1,230	178	178
20	4,110	2,510	778	3,200	9,310	2,040	.....	.....	.....	820	178	160
21	4,500	1,890	778	12,500	4,700	1,470	.....	.....	.....	478	145	130
22	2,670	1,600	778	5,350	3,020	1,290	2,350	.....	.....	478	195	118
23	2,350	1,350	910	3,380	2,350	1,120	2,350	.....	.....	358	178	118
24	4,110	1,230	1,230	2,670	1,600	1,180	1,890	.....	.....	305	235	118
25	8,790	1,180	1,120	6,290	1,350	2,040	1,740	.....	.....	305	195	145
26	6,290	1,060	2,040	4,110	1,350	7,790	17,100	.....	.....	960	330	118
27	3,740	1,010	1,740	3,380	1,120	9,310	.....	.....	.....	1,740	820	105
28	2,350	1,060	1,290	3,020	1,060	10,900	.....	.....	.....	2,350	735	118
29	2,040	1,120	1,180	3,740	.....	11,400	.....	.....	.....	2,040	778	118
30	1,740	910	1,180	4,910	.....	9,830	.....	.....	.....	1,010	865	95
31	1,350	.....	1,060	7,790	.....	6,290	.....	.....	.....	618	655	.....
1914–15.												
1	95	235	271	1,470	15,900	1,230	136	1,060	2,840	207	403	1,290
2	78	305	1,010	778	22,600	566	330	735	2,670	231	427	820
3	70	215	1,290	960	10,100	910	640	695	3,740	305	2,190	695
4	95	195	1,120	1,120	5,810	695	1,540	484	2,120	305	778	655
5	95	160	1,010	1,280	3,920	610	1,350	458	1,540	244	695	580
6	130	160	1,600	1,540	1,960	595	1,180	330	1,230	380	403	735
7	118	178	1,540	20,200	2,430	552	2,510	248	1,230	368	305	820
8	118	160	1,540	6,290	2,840	504	2,040	211	1,410	305	262	538
9	130	178	1,600	2,840	2,840	838	1,540	184	910	336	248	588
10	145	160	1,740	2,430	2,840	167	3,200	160	735	285	341	497
11	178	70	1,820	2,120	3,020	148	2,840	151	735	258	285	409
12	178	130	1,890	2,190	2,840	157	3,200	385	552	397	262	358
13	118	178	2,040	2,190	2,840	215	2,840	397	531	415	2,270	320
14	178	195	1,670	2,590	2,670	341	2,510	271	3,920	315	865	271
15	305	280	1,600	2,840	2,840	231	2,270	219	2,670	258	1,960	244
16	445	235	1,470	3,020	2,670	1,120	2,120	174	1,540	223	1,350	215
17	735	910	1,350	5,810	2,670	1,120	1,540	151	2,270	573	2,670	184
18	820	618	1,470	13,600	2,350	778	1,350	142	1,290	504	3,740	588
19	618	478	1,600	18,500	1,540	478	865	128	910	380	1,670	4,500
20	478	580	4,500	12,200	1,120	397	552	271	545	524	820	2,350
21	358	655	7,290	7,290	865	325	439	484	415	595	1,230	1,410
22	258	545	3,740	6,050	655	167	363	559	504	778	1,670	1,230
23	178	545	2,840	6,290	497	154	580	4,910	504	504	1,470	471
24	145	545	2,120	6,290	820	133	531	2,350	363	421	1,120	244
25	258	195	1,820	4,910	6,050	148	385	1,290	266	380	1,060	167
26	235	160	1,670	4,110	5,350	154	262	1,060	258	325	695	133
27	258	151	1,410	3,020	4,910	271	207	910	276	258	1,670	380
28	215	136	1,180	1,540	1,740	188	346	778	240	227	1,410	320
29	178	211	1,290	1,350	.....	148	1,540	1,060	207	219	2,040	253
30	215	142	3,020	1,120	.....	181	1,350	4,300	207	484	3,560	223
31	258	.....	2,840	1,670	.....	157	.....	4,910	.....	439	2,190	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 130 and 5,350 second-feet and poorly defined at other stages. Discharge Jan. 9–19, 1914, estimated, because of ice, at 1,000 second-feet. Some ice was reported on the river Feb. 13–18 and Mar. 3–15, 1914; discharge for these periods may therefore be somewhat too high because of use of open-water rating curve.

Monthly discharge of Cheat River near Parsons, W. Va., for the year ending Sept. 30, 1913–1915.

[Drainage area, 716 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1913.						
January	15,300	1,120	3,620	5.06	5.83	B.
February	3,560	695	1,740	2.43	2.53	B.
March	10,400	820	2,840	3.97	4.58	B.
June	2,350	195	934	1.30	1.45	B.
July	9,050	545	1,800	2.51	2.89	B.
August	7,540	235	995	1.39	1.60	B.
September	4,500	130	751	1.05	1.17	B.
1913–14.						
October	8,790	305	2,200	3.07	3.54	B.
November	22,900	545	4,100	5.73	6.39	B.
December	4,910	695	1,350	1.89	2.18	B.
January	12,500	.....	2,500	3.49	4.02	B.
February	9,310	580	2,450	3.42	3.56	B.
March	11,400	510	3,030	4.23	4.88	B.
July	4,700	215	1,010	1.41	1.63	B.
August	1,010	145	402	.561	.64	B.
September	415	95	166	.232	.26	B.
1914–15.						
October	820	70	248	.346	.40	B.
November	910	70	297	.415	.46	B.
December	7,290	271	1,980	2.77	3.19	B.
January	20,200	778	4,760	6.65	7.67	B.
February	22,600	497	4,170	5.82	6.06	B.
March	1,230	133	441	.616	.71	B.
April	3,200	136	1,350	1.89	2.11	B.
May	4,910	128	950	1.33	1.53	B.
June	3,920	207	1,220	1.70	1.90	B.
July	778	207	369	.515	.59	B.
August	3,740	248	1,290	1.80	2.08	B.
September	4,500	133	716	1.00	1.12	B.
The year	22,600	70	1,470	2.05	27.82	

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.

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

RECORDS AVAILABLE.—July 19, 1912, to September 30, 1915. The United States Weather Bureau has collected gage-height records since 1884.

GAGE.—Mott tape gage attached to upstream side of bridge, read once daily to tenths prior to January 17, 1913, and twice daily to tenths subsequent to that date, by E. C. Proudfoot.

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.—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, 10.5 feet at 4 p. m. January 7; minimum stage, 1.4 feet October 6–8.

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

WINTER FLOW.—Discharge relation affected by ice during extremely cold weather.

ACCURACY.—Gage-height records are considered reliable.

COOPERATION.—Gage-height record subsequent to January 1, 1913, and results of discharge measurements furnished by F. W. Scheidenhelm, Pittsburgh, Pa. Gage-height record prior to January 1, 1913, furnished by the United States Weather Bureau.

Data inadequate for estimates of discharge.

The following discharge measurements were made by James E. Stewart.

May 24, 1915: Gage height, 3.69 feet (discharge, 1,880 second-feet).

May 25, 1915: Gage height, 3.38 feet (discharge, 1,440 second-feet).

Daily gage height, in feet, of Cheat River at Rowlesburg, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.6	2.3	2.6	4.6	5.6	3.5	3.0	3.9	4.9	2.3	2.6	3.8
2	1.5	2.3	3.2	4.2	9.9	3.4	3.0	3.6	4.1	2.2	2.7	3.4
3	1.5	2.3	3.2	3.5	8.6	3.2	2.9	3.3	4.4	2.3	3.2	3.1
4	1.5	2.4	3.3	3.2	6.5	3.1	2.9	3.3	4.9	2.4	3.5	2.8
5	1.5	2.4	4.0	3.0	5.8	3.0	2.8	3.1	4.2	2.5	3.2	2.6
6	1.4	2.4	4.6	2.8	4.6	3.3	2.8	3.1	3.9	2.4	2.9	2.8
7	1.4	2.3	4.2	8.4	4.4	3.3	4.2	3.2	3.5	2.8	2.8	2.9
8	1.4	2.2	3.7	7.0	4.4	3.4	4.3	3.2	3.3	2.9	2.4	2.8
9	1.9	2.2	3.8	5.2	3.8	3.2	4.1	3.0	3.2	2.5	2.5	2.7
10	1.9	2.1	3.8	4.6	3.6	3.0	4.0	3.0	3.1	2.3	2.5	2.7
11	2.1	2.3	3.4	3.8	3.3	2.8	4.3	2.8	3.0	2.5	2.5	2.5
12	2.2	2.2	3.3	4.1	3.3	3.3	5.0	2.9	2.8	2.9	2.4	2.5
13	2.2	2.2	3.3	4.1	3.8	3.1	4.6	3.8	2.6	2.9	2.4	2.3
14	2.2	2.2	3.3	4.2	4.8	2.9	4.4	3.5	3.0	2.5	3.6	2.3
15	2.2	2.2	3.2	3.8	4.8	3.2	4.1	3.5	4.2	2.3	3.0	2.2
16	2.6	2.9	3.0	4.5	5.9	3.3	3.8	3.2	3.9	2.3	3.8	2.2
17	3.1	3.2	2.9	4.5	4.9	3.6	3.5	2.8	3.6	2.5	3.1	2.2
18	3.2	3.3	2.9	7.7	4.4	3.4	3.2	2.6	3.1	2.9	5.7	2.8
19	2.7	2.9	.....	8.3	3.9	3.2	3.0	2.6	3.1	2.8	4.2	4.2
20	2.6	2.7	4.0	6.6	3.6	3.2	3.0	2.5	2.9	2.7	3.5	4.9
21	2.5	2.5	5.8	5.1	3.1	3.0	2.9	2.5	2.8	2.6	3.2	4.3
22	2.4	2.4	7.0	4.1	3.1	2.9	2.9	2.7	2.7	3.2	3.1	4.9
23	2.4	2.3	5.0	3.8	3.2	2.8	2.8	3.8	2.6	2.9	3.6	4.4
24	2.3	2.3	4.6	3.8	3.3	2.7	3.7	3.9	2.5	2.7	3.3	3.4
25	2.3	2.2	4.4	4.2	5.5	2.6	3.4	3.5	2.5	2.5	3.3	3.2
26	2.2	2.2	3.9	4.2	4.4	2.9	3.4	3.3	2.5	2.5	3.2	3.0
27	2.3	2.1	3.5	3.6	3.9	3.8	3.1	3.2	2.4	2.4	3.0	2.8
28	2.3	2.1	3.3	3.6	3.8	3.5	3.3	3.1	2.4	2.4	3.1	2.8
29	2.2	2.0	3.2	3.4	.....	3.3	4.1	3.2	2.4	2.3	4.1	2.7
30	2.5	.....	6.5	2.8	.....	3.2	4.5	4.9	2.3	2.3	4.0	2.6
31	2.3	.....	5.9	3.1	.....	3.1	.....	6.1	.....	2.5	4.2	.....

NOTE.—River frozen Dec. 19. Gage read 8.4 feet at 4 p. m., Dec. 21; 10.5 feet at 4 p. m. Jan. 7; 10.3 feet at 5 p. m. Feb. 2; and 5.8 feet at 2 p. m. Sept. 19.

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, 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 5 p. m. February 2 (discharge, 34,500 second-feet); minimum stage, 1.75 feet at 5 p. m. October 6 (discharge, 178 second-feet).

WINTER FLOW.—Ice forms sometiimes to a thickness of several inches, and large ice jams may affect the discharge relation during short periods in December, January, and February.

ACCURACY.—Records good.

The following discharge measurement was made from a boat by J. H. Morgan: November 30, 1914: Gage height, 2.22 feet; discharge, 306 second-feet.

Daily discharge in second-feet, of Cheat River near Morgantown, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	227	426	352	5,110	16,200	2,080	1,430	3,460	7,510	375	625	2,080
2	224	452	625	3,620	34,500	1,840	1,180	1,730	5,110	400	545	1,180
3	202	425	1,340	2,680	25,400	1,520	980	1,960	6,020	452	625	915
4	196	400	1,520	1,730	15,200	1,340	1,260	1,730	6,020	425	2,080	805
5	196	352	2,710	1,620	9,040	1,260	1,040	1,620	3,790	512	1,040	710
6	180	330	7,510	1,340	9,040	1,620	1,040	1,620	3,060	452	860	710
7	180	330	3,960	27,400	7,000	1,730	2,200	1,430	2,320	545	625	585
8	208	320	3,460	17,200	5,110	1,960	3,790	1,180	1,840	585	758	648
9	188	310	3,300	9,040	3,790	1,730	3,300	1,120	1,430	545	545	710
10	185	310	3,150	6,250	2,710	1,430	2,710	980	1,180	480	512	625
11	220	310	3,000	3,460	2,450	1,730	2,080	805	1,120	425	452	625
12	200	290	2,200	4,140	2,320	1,960	5,110	860	915	425	425	480
13	310	290	1,860	4,510	4,700	1,520	5,110	1,620	758	452	545	425
14	310	290	1,520	3,300	9,040	1,430	3,960	2,080	980	585	2,320	375
15	330	300	980	3,000	10,100	1,730	2,860	1,430	3,460	452	710	330
16	585	310	710	6,020	12,100	1,840	2,450	1,180	2,580	425	1,180	330
17	710	480	625	14,400	7,510	1,960	1,620	1,040	1,620	545	1,180	330
18	915	915	545	22,800	4,700	1,840	1,260	980	1,180	710	7,000	710
19	668	710	805	23,800	3,300	1,430	1,430	915	915	860	3,300	2,710
20	625	545	10,000	15,200	2,450	1,430	1,260	805	915	668	1,960	6,020
21	625	452	19,200	8,020	1,840	1,180	1,220	1,120	805	710	1,180	3,620
22	512	402	18,200	3,620	1,620	1,120	1,180	6,020	625	860	1,040	4,510
23	425	352	11,300	3,620	1,520	980	1,730	8,020	545	860	1,430	2,580
24	400	310	4,320	3,880	1,520	980	3,300	5,550	545	625	1,730	1,520
25	375	310	3,790	4,140	4,140	860	3,000	2,860	480	545	1,430	1,040
26	352	330	2,200	3,460	4,320	1,840	2,320	2,200	425	512	1,180	899
27	352	352	2,390	2,860	2,860	3,000	1,730	1,730	400	425	915	758
28	400	352	2,580	2,320	1,730	1,730	3,960	1,620	352	375	860	758
29	400	352	1,120	1,840	.....	2,080	3,620	1,340	352	375	2,200	758
30	375	352	13,600	1,620	.....	1,840	5,550	7,970	352	352	2,860	585
31	401	.....	10,600	1,520	.....	1,520	.....	14,600	.....	452	2,710	.....

NOTE.—Discharge determined from a rating curve well defined between 115 and 47,800 second-feet. Open-water rating curve used throughout the year. Daily discharge Sept. 12–21 was obtained by comparison with records at Rowlesburg and Parsons.

Monthly discharge of Cheat River near Morgantown, W. Va., for the year ending Sept. 30, 1915.

[Drainage area, 1,380 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	915	180	373	0.270	0.31	B.
November	915	290	389	.282	.31	B.
December	19,200	352	4,500	3.26	3.76	B.
January	27,400	1,340	6,890	4.99	5.75	B.
February	34,500	1,520	7,360	5.33	5.55	B.
March	3,000	860	1,630	1.18	1.36	A.
April	5,550	980	2,460	1.78	1.99	A.
May	14,600	805	2,630	1.91	2.20	A.
June	7,510	352	1,920	1.39	1.55	A.
July	860	352	529	.383	.44	A.
August	7,000	425	1,450	1.05	1.21	A.
September	6,020	330	1,280	.928	1.04	B.
The year	34,500	180	2,590	1.88	25.47	

Days of deficiency in discharge of Cheat River near Morgantown, W. Va., for the year ending Sept. 30, 1903–1915.

Discharge in sec.-ft.	Days of deficient discharge.										
	1902–3	1903–4	1904–5	1905–6[a]	1908–9[b]	1909–10	1910–11	1911–12	1912–13	1913–14	1914–15
130	.....	0	0	.....	.....	.....	.....	.....	.....	.....	.....
140	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....
170	0	3	1	.....	.....	.....	.....	.....	.....	.....	0
200	1	19	9	.....	.....	0	0	.....	.....	0	6
250	11	48	29	0	.....	7	12	.....	0	10	11
300	29	76	64	11	.....	23	40	0	7	22	15
350	37	95	76	11	0	38	71	3	13	37	32
400	50	115	86	12	6	48	85	4	16	49	51
500	84	137	107	16	22	74	109	10	35	75	82
600	104	145	119	17	36	87	122	25	57	92	102
750	128	158	136	21	57	101	143	33	83	104	126
900	137	181	153	27	69	128	150	53	107	123	144
1,100	148	195	170	38	87	166	168	74	135	136	165
1,300	158	215	188	53	102	199	178	93	160	149	187
1,600	172	238	216	60	118	224	190	117	184	177	211
1,900	184	259	251	61	128	240	201	137	204	208	243
2,300	207	273	265	65	141	253	218	171	226	223	259
2,700	227	284	276	72	157	271	236	188	241	238	272
3,200	240	294	287	72	169	279	253	220	266	256	288
3,700	253	303	296	76	174	288	272	242	272	271	304
4,300	270	313	305	77	190	295	287	255	286	285	315
5,000	284	321	315	83	207	307	295	271	299	289	321
6,000	295	327	327	83	230	318	309	282	307	298	328
8,000	320	341	341	88	249	335	327	310	328	310	340
10,000	335	355	348	89	257	346	342	324	339	326	346
13,000	343	361	355	90	267	354	348	338	348	342	351
17,000	353	365	360	92	272	358	360	350	356	351	357
22,000	359	366	362	.....	273	363	362	358	359	359	360
30,000	365	.....	364	.....	.....	364	364	364	365	364	364
45,000	.....	.....	365	.....	.....	365	365	366	.....	365	365

[a] Oct. 1 to Dec. 31, 1905. [b] Jan. 1 to Sept. 30, 1909.

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, 1915.

GAGE.—Chain gage attached to upstream side of bridge; read morning and evening, to tenths, by J. W. Ramsey and French Shaffer.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Coarse gravel and stones.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.8 feet at 8 a. m. February 2 (discharge, estimated by extending the rating curve, 7,840 second-feet); minimum stage, 1.8 feet at 5 p. m. June 27 and 7 a. m. and 5 p. m. June 28 (discharge estimated at 25 second-feet).

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.

WINTER FLOW.—Discharge relation probably not affected by ice except during extremely cold weather.

ACCURACY.—Station was first visited by engineers of the Survey in March, 1916. Discharge measurements made at gage heights 3.42 and 4.27 during this visit and computed before the publication of this report plot respectively 17 and 30 per cent small of the rating curve used from 1911 to 1914. It is believed that monthly discharges as published in Water-Supply Paper 383 are probably as accurate as indicated. Discharge data for 1915 are withheld for additional information.

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

No discharge measurements were made at this station during the year.

Daily gage height, in feet, of Blackwater at Hendricks, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.90	2.18	2.30	3.3	6.4	2.55	2.45	2.45	2.75	2.05	2.00	2.45
2	1.90	2.10	2.40	2.80	6.7	2.35	2.80	2.45	3.8	2.00	2.00	2.55
3	1.90	2.02	2.58	2.60	5.4	2.35	2.70	2.45	3.85	2.00	3.95	2.50
4	1.90	1.95	2.90	2.60	4.4	2.30	2.35	2.45	3.35	2.00	3.15	2.35
5	1.90	1.95	2.80	2.60	3.6	2.30	2.35	2.80	2.95	1.90	2.55	2.30
6	1.90	1.95	2.60	3.3	3.7	2.38	2.70	2.70	2.75	2.00	2.10	2.30
7	1.90	1.90	2.50	6.0	3.45	2.52	3.4	2.55	2.40	2.00	1.95	2.15
8	1.90	1.90	2.60	4.8	3.15	2.38	2.75	2.50	2.50	2.00	1.95	2.20
9	1.98	1.98	2.60	4.2	2.85	2.30	2.85	2.45	2.40	2.00	2.00	2.30
10	1.92	1.95	2.75	3.9	2.65	2.30	2.85	2.15	2.35	2.00	2.00	2.30
11	2.00	1.95	2.55	3.75	2.60	2.30	3.25	2.35	2.10	2.00	1.95	2.15
12	1.95	1.92	2.35	3.9	2.80	2.28	3.8	2.25	2.20	2.25	2.05	2.30
13	1.95	1.90	2.20	3.7	3.95	2.30	3.35	2.70	2.10	2.10	2.15	2.15
14	2.18	1.90	2.18	3.35	3.9	2.35	2.85	2.45	3.75	2.05	2.00	2.20
15	2.25	2.05	2.20	3.15	4.4	2.55	2.50	2.30	2.85	2.00	2.05	2.20
16	2.52	2.80	2.20	3.0	3.8	2.85	2.45	2.25	2.55	2.25	1.95	2.10
17	2.40	2.50	2.20	5.1	3.00	2.65	2.70	2.20	2.35	2.45	3.3	2.00
18	2.20	2.25	2.20	5.9	2.85	2.35	2.50	2.30	2.25	2.20	3.45	2.00
19	2.42	2.05	2.50	4.9	2.68	2.30	2.35	2.20	2.20	2.00	2.30	5.9
20	2.25	2.40	3.3	4.35	2.60	2.20	2.60	2.20	2.10	2.05	2.25	4.7
21	2.12	2.40	5.6	3.3	2.52	2.20	2.40	2.25	2.10	2.10	2.20	4.5
22	2.08	2.20	4.5	2.95	2.60	2.25	2.30	2.50	2.10	2.15	2.40	4.55
23	2.00	1.90	3.8	2.95	2.50	2.25	2.70	2.66	2.00	2.10	2.70	3.5
24	2.00	2.00	3.2	3.15	3.35	2.22	2.50	2.55	2.00	2.10	2.45	3.45
25	2.00	2.00	2.95	2.95	3.9	2.28	2.80	2.45	2.00	2.00	2.40	2.35
26	2.00	2.00	2.85	2.75	2.90	3.15	2.45	2.25	2.00	1.95	2.30	2.30
27	2.02	2.00	2.70	2.60	2.70	2.85	2.30	2.30	1.85	1.90	2.25	2.60
28	2.00	2.00	2.70	2.50	2.70	2.65	2.60	2.30	1.80	1.90	2.75	2.45
29	1.97	1.90	2.80	2.50	.....	2.70	2.50	2.30	1.90	1.90	3.45	2.30
30	2.40	2.00	4.8	2.40	.....	2.60	2.80	4.15	1.90	1.90	3.95	2.25
31	2.25	.....	3.9	2.80	.....	2.60	.....	3.75	.....	2.00	3.35	.....

NOTE.—Backwater from ice, Nov. 20-22. Gage read to top of ice Dec. 15-20.

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, 1915.

GAGE.—Standard chain gage attached to bridge; read daily, morning and evening, to tenths, 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. Point of zero flow determined by levels run September 4, 1912, gage height, 1.8 feet ±0.2 foot; on November 8, 1913, this stage was found to be 1.9 feet ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9. 3 feet at 7 a. m. January 7 (discharge, 10,900 second-feet); minimum stage, 2 feet at 7 a. m. October 7 and 6 p. m. June 25 (discharge, 1 second-foot).

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

WINTER FLOW.—Discharge relation affected by ice during severe winters.

DIVERSIONS.—None.

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.—Records of daily discharge are considered good.

The following discharge measurements were made by J. G. Mathers:

November 26, 1914: Gage height, 2.89 feet; discharge, 63.7 second-feet and 63.6 second-feet.

Daily discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	144	164	605	2,220	365	113	520	1,860	88	144	183
2	10	100	480	440	6,330	348	113	520	2,070	88	183	183
3	7	88	480	365	4,670	330	128	562	2,360	113	208	164
4	4	88	520	183	1,930	330	144	520	2,830	88	144	144
5	4	78	562	233	652	402	113	520	2,220	1,860	113	144
6	4	68	905	264	520	365	128	365	440	1,790	128	113
7	3	68	440	8,220	440	365	208	402	183	1,520	100	144
8	7	88	480	2,220	402	264	330	330	144	1,590	144	113
9	19	88	520	1,020	365	233	295	183	144	1,390	144	144
10	16	68	562	700	295	183	365	183	113	1,460	128	113
11	12	68	440	605	402	183	1,930	233	113	1,520	164	105
12	7	88	330	750	402	144	2,220	233	128	520	183	96
13	12	68	233	700	700	144	1,520	183	113	440	183	88
14	12	68	183	1,080	905	113	1,460	144	2,590	402	365	88
15	183	88	160	1,720	1,460	128	1,080	144	2,670	233	183	78
16	200	78	136	1,840	2,360	144	700	113	2,360	208	605	88
17	128	68	113	1,950	1,720	113	750	113	1,790	183	1,260	68
18	144	68	144	2,070	905	128	605	100	1,390	233	700	78
19	128	68	128	5,270	750	144	605	88	402	183	562	144
20	113	52	800	2,220	605	144	562	113	295	144	365	144
21	113	60	2,510	1,660	440	144	520	113	183	164	295	164
22	113	68	1,520	700	365	113	330	144	144	183	520	144
23	113	88	750	520	233	128	480	233	144	144	402	113
24	128	78	440	295	402	113	520	208	113	144	295	144
25	113	78	330	440	700	88	520	208	88	128	233	128
26	113	60	233	402	700	88	365	233	88	113	233	113
27	88	52	183	233	520	88	233	208	88	100	183	113
28	100	68	144	164	365	113	562	264	52	88	208	113
29	128	52	233	144	.....	113	605	365	46	144	520	88
30	183	60	1,520	128	.....	100	750	700	60	183	402	208
31	144	.....	1,200	700	.....	144	.....	2,360	.....	144	233	.....

NOTE.—Discharge determined from a rating curve well defined between 39 and 7,740 second-feet and fairly well defined at other stages. Open-water rating curve used throughout the year; discharge relation probably not materially affected by ice. Discharge interpolated Dec. 15, 16, Jan. 16, 17, Mar. 2, July 25, Sept. 11 and 12. Discharge estimated Oct. 16 because of error in gage reading.

Monthly discharge of Shavers Fork at Parsons, W. Va., for the year ending Sept. 30, 1915.

[Drainage area, 210 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	[a] 200	3	76.2	0.363	0.42	A.
November	144	52	75.2	.358	.40	A.
December	2,510	113	543	2.59	2.99	A.
January	8,220	128	1,220	5.81	6.70	A.
February	6,330	233	1,130	5.38	5.60	A.
March	402	88	1,870	8.90	10.26	A.
April	2,220	113	608	2.90	3.24	A.
May	2,360	88	342	1.63	1.88	A.
June	2,830	46	841	4.00	4.46	A.
July	1,860	88	503	2.40	2.77	A.
August	1,260	100	307	1.46	1.68	A.
September	208	68	125	.595	.66	A.
The year	8,220	3	493	2.35	41.06	

[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, 1915.

GAGE.—Chain gage attached to downstream side of bridge; read morning and evening, to half-tenths, by Mrs. W. O. Walls.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.2 feet at 5 p. m. February 1 (discharge, 8,390 second-feet); minimum stage, 2.35 feet October 12 (discharge, approximately 0.4 second-foot).

WINTER FLOW.—Probably not affected by ice, except 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.—Accuracy of estimates in the following tables depends upon the permanence of the discharge relation subsequent to 1913.

No discharge measurements were made at this station during the year.

Daily discharge, in second-feet, of Big Sandy Creek at Rockville, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.0	18	45	633	6,300	228	203	330	739	23	32	14
2	2.0	17	85	503	7,340	203	191	228	633	31	36	9.0
3	2.0	14	45	412	3,720	191	169	203	586	38	58	38
4	1.0	21	58	330	2,780	180	133	180	523	49	63	33
5	1.0	14	739	269	3,080	169	142	180	429	55	55	26
6	2.0	12	798	2,220	2,220	215	126	150	314	58	54	22
7	3.7	7.0	586	3,890	1,430	255	150	118	228	63	14	21
8	2.7	14	523	1,430	633	284	133	118	180	54	41	20
9	1.7	15	633	465	503	346	142	111	150	49	54	16
10	1.0	15	633	378	484	314	118	91	118	47	41	14
11	.4	9.6	798	543	314	284	126	79	118	34	41	9.6
12	.3	8.0	633	503	412	314	142	79	98	30	34	8.6
13	.5	6.0	543	465	633	284	228	142	91	28	41	6.0
14	.9	5.0	523	523	1,200	299	228	160	85	19	30	4.2
15	1.0	6.0	447	543	1,200	284	191	126	79	38	22	33
16	.7	21	346	1,100	798	314	169	118	74	49	23	26
17	.6	54	362	1,950	633	284	169	150	68	79	28	17
18	10	28	503	3,390	395	228	133	150	52	55	22	21
19	63	41	633	3,720	362	284	150	126	45	52	18	41
20	49	49	1,560	1,310	299	330	133	118	34	54	12	74
21	43	34	5,700	633	284	180	150	447	32	85	11	98
22	28	23	3,230	346	255	180	169	3,390	32	74	19	8.0
23	26	17	1,430	586	215	160	523	2,360	41	41	26	5.4
24	19	9.0	633	633	284	160	862	862	31	31	28	13
25	21	9.0	395	503	346	228	543	633	21	34	30	14
26	38	12	330	484	299	586	684	412	18	30	28	14
27	43	9.0	180	395	228	523	429	299	17	30	34	49
28	45	8.0	133	314	203	330	739	241	17	23	28	98
29	38	5.0	1,950	284	.....	299	586	382	13	14	85	79
30	36	7.0	1,950	203	.....	228	447	523	15	10	269	45
31	28	.....	862	633	.....	203	.....	1,430	.....	13	142	.....

NOTE.—Discharge determined from a rating curve well defined between 60 and 7,970 second-feet. Discharge interpolated May 29 when the gage was not read. Open-water rating curve used throughout the year.

Monthly discharge of Big Sandy Creek at Rockville, W. Va., for the year ending Sept. 30, 1915.

[Drainage area, 202 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	63	0.3	16.5	0.082	0.09	C.
November	54	5.0	16.9	.084	.09	B.
December	5,700	45	880	4.36	5.03	B.
January	3,890	203	955	4.73	5.45	B.
February	7,340	203	1,320	6.53	6.80	B.
March	586	160	270	1.34	1.54	B.
April	862	118	277	1.37	1.53	B.
May	3,390	79	450	2.23	2.57	B.
June	739	13	163	.807	.90	B.
July	85	10	41.6	.206	.24	C.
August	269	11	45.8	.227	.26	C.
September	98	4.2	29.2	.145	.16	C.
The year	7,340	.3	367	1.82	24.66	

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 to September 30, 1915.

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

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, although at extreme high stages water flows around both bridge abutments. Below high water both banks covered with brush and timber above and below bridge. Channel straight for 100 feet above and 300 feet below station. Heavy rapids about 600 feet below bridge act as principal control. Control probably permanent. Point of zero flow, gage height, 0.1 ± 0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 7.6 feet at 7 a. m. August 9; minimum, 2.45 feet at 7 a. m. September 17.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Little Beaver Creek near East Liverpool, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 17	Stewart and Inglefield.	2.87	133	July 19	C. L. Inglefield.....	3.70	359
July 18	E. F. Archibald.....	4.09	495	Sept. 22	B. J. Peterson.....	2.98	155

Daily gage height, in feet, of Little Beaver Creek near East Liverpool, Ohio, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1.....	.....	3.45	5.6	3.55	2.95	16.....	.....	5.1	4.6	4.2	2.48
2.....	.....	3.3	4.6	4.2	2.85	17.....	2.85	4.1	5.2	4.0	2.48
3.....	.....	4.1	4.6	5.6	2.75	18.....	2.9	3.6	4.2	3.6	2.48
4.....	.....	4.6	6.0	6.8	2.7	19.....	2.75	3.45	3.7	3.35	4.9
5.....	.....	4.1	6.6	5.3	2.75	20.....	2.68	3.25	3.45	3.2	4.0
6.....	.....	3.7	5.5	4.3	3.0	21.....	3.4	3.05	3.35	3.25	3.35
7.....	.....	3.4	4.6	3.9	3.15	22.....	4.9	2.9	3.25	3.4	3.0
8.....	.....	4.0	5.5	3.85	2.9	23.....	4.2	2.9	3.1	3.45	2.8
9.....	.....	3.6	5.6	7.1	2.8	24.....	3.85	2.8	3.0	3.3	2.7
10.....	.....	3.3	4.5	5.3	3.2	25.....	3.75	2.7	2.9	3.15	2.66
11.....	.....	3.1	4.2	4.5	2.95	26.....	3.45	3.0	2.85	3.05	2.66
12.....	.....	3.0	4.4	4.4	2.8	27.....	3.2	2.9	3.1	3.0	2.95
13.....	.....	3.45	4.1	4.4	2.7	28.....	3.1	2.69	2.9	2.9	3.05
14.....	.....	3.6	3.6	4.0	2.62	29.....	3.3	2.58	3.15	3.15	2.85
15.....	.....	5.5	3.55	3.7	2.56	30.....	3.7	5.8	3.4	3.3	2.7
						31.....	3.7	.....	3.4	3.05	.....

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 to September 30, 1915.

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

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

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

EXTREMES OF STAGE.—Maximum stage recorded, 7.0 feet at 6 a. m. July 5; minimum stage recorded 1.94 feet at 6 p. m. September 18.

Highest known flood reached a stage represented approximately by gage eight 16 feet.

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Yellow Creek at Hammondsville, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 12	J. E. Stewart	2.44	36.1
July 19	C. L. Inglefield	3.13	132
Sept. 23	B. J. Peterson	2.12	15.8

Daily gage height, in feet, of Yellow Creek at Hammondsville, Ohio, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug	Sept	Day	May	June.	July.	Aug.	Sept
1	.....	3.35	4.7	2.70	2.22	16	2.44	4.7	4.2	2.48	2.02
2	.....	3.25	4.7	3.3	2.16	17	2.50	4.0	3.8	2.44	1.99
3	.....	5.5	4.7	4.2	2.10	18	2.44	3.4	3.3	2.41	1.95
4	.....	4.3	4.8	3.4	2.02	19	2.40	3.2	3.15	2.36	2.53
5	.....	3.9	6.5	3.05	2.59	20	2.40	3.0	3.0	2.32	2.38
6	.....	3.35	4.5	2.90	2.76	21	2.93	2.92	2.98	2.29	2.22
7	.....	3.15	3.9	2.84	2.72	22	3.8	2.82	2.93	2.52	2.13
8	.....	3.35	4.4	2.78	2.46	23	3.7	2.73	2.81	2.57	2.06
9	.....	3.05	3.65	2.95	2.36	24	3.5	2.64	2.70	2.44	2.02
10	.....	2.86	3.3	2.71	2.48	25	3.35	2.58	2.63	2.34	2.04
11	.....	2.78	3.3	2.58	2.37	26	3.1	2.54	2.63	2.29	2.20
12	.....	2.73	3.2	2.63	2.28	27	2.92	2.50	2.65	2.25	2.59
13	2.41	4.2	2.98	2.76	2.22	28	2.80	2.46	2.59	2.32	2.40
14	2.41	3.8	2.86	2.60	2.12	29	3.9	2.42	2.61	2.40	2.20
15	2.38	4.9	3.75	2.53	2.06	30	3.8	6.5	3.15	2.36	2.08
						31	3.8	.....	2.68	2.28	.....

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 to September 30, 1915.

GAGE.—Vertical and inclined staff on left bank immediately below the bridge; read twice daily, to hundredths, 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. Both banks high and clean. Principal control is at foundation of old mill dam 250 feet below station; it is composed of bed rock, foundation timbers, small deposit of rock and sand, and is probably permanent. Point of zero flow, at gage height 1.4 feet $\pm$0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 9.8 feet at 11 a. m. May 30; minimum stage recorded, 2.05 at 6 p. m. June 28, 6.45 a. m. and 6 p. m. June 29, 7 p. m. July 29, and 5.30 a. m. July 30.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determination of daily discharge.

Discharge measurements of Middle Island Creek at Little, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 7	Ellsworth and Frosch	2.39	53.1
10	....do....	2.34	38.6
Sept. 24	B. J. Peterson	2.80	162

Daily gage height, in feet, of Middle Island Creek at Little, W. Va., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	3.89	2.18	2.49	3.10	16	2.19	3.44	2.27	2.18	2.38
2	.....	3.31	3.09	2.52	2.85	17	2.17	3.15	2.36	2.22	2.30
3	.....	4.51	3.46	2.40	2.65	18	2.15	2.95	2.78	2.48	2.25
4	.....	5.65	3.92	2.46	2.75	19	2.11	2.80	2.76	2.30	5.45
5	.....	3.86	3.61	2.40	4.70	20	2.09	2.60	2.58	2.28	4.78
6	.....	3.28	3.10	2.29	4.39	21	2.10	2.48	2.42	2.21	3.75
7	2.39	3.04	2.69	2.26	4.00	22	2.34	2.38	2.38	2.22	3.12
8	2.39	2.91	2.58	2.55	3.80	23	6.30	2.30	2.35	2.40	3.05
9	2.36	2.78	3.16	4.40	3.42	24	4.02	2.24	2.29	2.48	2.80
10	2.34	2.69	2.90	3.70	3.21	25	3.16	2.19	2.20	2.65	2.66
11	2.31	2.57	2.64	2.90	2.92	26	2.90	2.14	2.14	2.46	2.59
12	2.28	2.86	2.52	2.54	2.76	27	2.80	2.09	2.08	2.35	2.52
13	2.24	2.86	2.40	2 50	2.68	28	2.79	2.06	2.15	2.52	2.47
14	2.22	2.88	2.36	2.32	2.55	29	2.79	2.05	2.08	2.85	2.38
15	2.20	2.85	2.30	2.22	2.44	30	6.52	2.12	2.08	3.12	2.35
						31	5.21	.....	2.12	3.50	.....

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 to September 30, 1915.

GAGE.—Inclined and vertical staff on right bank about 400 feet below suspension footbridge; read twice daily, to hundredths, 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. Both banks fairly clean; overflow at gage height about 13 feet; wide overflow at maximum stages. Bed of stream mud, sand, rock, and gravel; principal control at ford 50 feet below gage is compact sand and gravel, fairly permanent. Point of zero flow, gage height 0.7 ± 0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 7.55 feet at 7 a. m. September 19; minimum, 1.33 feet at 6.30 p. m. May 19.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Little Muskingum River at Fay, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 11	Ellsworth and Frosch	1.47	22.8
14	C. E. Ellsworth	1.43	19.6
Sept. 25	B. J. Peterson	1.87	74.7

Daily gage height, in feet, of Little Muskingum River at Fay, Ohio, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	2.40	3.86	1.82	1.65	16	1.42	4.38	2.65	1.40	1.72
2	.....	2.15	6.15	1.65	1.60	17	1.39	2.84	3.08	2.34	1.60
3	.....	2.08	5.92	1.55	1.58	18	1.39	2.48	2.32	2.00	1.59
4	.....	2.02	3.74	2.30	1.78	19	1.36	2.10	1.96	1.64	7.48
5	.....	1.90	2.71	1.86	2.60	20	1.40	1.92	1.79	1.55	3.16
6	.....	1.72	2.72	1.68	3.45	21	1.52	1.82	1.69	1.55	2.68
7	.....	1.65	2.30	1.58	2.85	22	3.01	1.74	1.60	2.75	2.42
8	.....	1.66	2.24	2.48	2.75	23	4.98	1.65	1.55	2.55	2.12
9	.....	1.61	2.44	3.96	2.32	24	2.95	1.60	1.55	2.72	1.99
10	.....	1.54	2.06	2.26	5.15	25	2.38	1.49	1.52	3.38	1.85
11	.....	1.52	1.88	1.81	3.22	26	2.20	1.40	1.40	2.46	1.74
12	.....	2.12	1.79	1.66	2.45	27	2.00	1.40	1.42	2.02	1.72
13	.....	2.20	1.72	1.62	2.18	28	1.85	1.36	1.45	2.28	1.92
14	1.43	2.62	1.68	1.52	2.06	29	2.00	1.36	1.39	2.45	1.82
15	1.41	4.08	1.60	1.48	1.84	30	4.32	1.72	1.55	2.25	1.79
						31	3.02	.....	1.56	1.85	.....

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 topograhic maps).

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

GAGE.—Vertical and inclined staff attached to upstream side of right pier of bridge; read twice daily, to hundredths, by Harold Wilmath and Fred Bannon, since June 1, when the gage established by the United States Weather Bureau September 10, 1900 (read daily to tenths at 8 a. m.) was repaired and its datum lowered 2.5 feet.

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. Left bank high, steep, and never overflows; right bank fairly high and steep, but overflows at extreme high stages. 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 since June 1, 8 feet at 6 p. m. September 8; minimum stage, 1.95 feet at 6 p. m. August 14.

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.

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—Normal so far as known.

ACCURACY.—Minimum low-water records of United States Weather Bureau are probably in error; records June 1 to September 30 fair, because poor gage reading.

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

Data inadequate for determining daily discharge.

Discharge measurements of Little Kanawha River at Glenville, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 30	C. E. Ellsworth	3.88	352
31	do	4.42	614
Sept. 14	B. J. Peterson	2.32	59.4

Daily gage height, in feet, of Little Kanawha River at Glenville, W. Va., for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	3.75	4.65	3.00	2.95	16	2.78	2.14	2.25	2.18
2	3.2	4.35	3.38	2.92	17	2.64	2.15	2.06	2.12
3	5.7	4.35	6.28	2.75	18	2.58	2.62	2.45	2.08
4	5.6	4.50	5.15	2.55	19	2.38	3.06	2.32	2.80
5	4.7	2.20	3.02	4.30	20	2.25	2.67	2.62	3.48
6	4.2	2.18	2.85	4.00	21	2.19	2.40	2.78	5.26
7	3.6	2.13	2.05	4.96	22	2.12	2.25	2.12	4.50
8	3.35	2.22	2.38	7.98	23	2.04	2.25	2.25	3.98
9	3.25	2.14	2.50	5.56	24	2.00	2.22	2.30	3.18
10	2.97	2.11	2.50	3.52	25	4.8	2.06	2.62	2.90
11	2.71	2.22	3.08	2.68	26	6.9	2.10	2.42	2.72
12	2.72	2.24	2.96	2.93	27	6.7	4.00	2.32	2.48
13	2.52	2.26	2.49	2.85	28	5.7	5.45	2.62	2.47
14	2.69	2.39	1.98	2.32	29	5.3	8.45	2.62	2.38
15	2.72	2.20	2.30	2.36	30	5.2	2.00	2.75	[a] 2.0
					31		2.22	2.98	

[a] U. S. Weather Bureau reading.

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 to September 30, 1915. The upper and lower gages at the lock have been read to tenths twice daily 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 twice daily, to hundredths, by James Burton, lockmaster.

DISCHARGE MEASUREMENTS.—Made by wading on the crest of the dam. Cable for making measurements installed 1,200 feet below lock in March, 1916.

CHANNEL AND CONTROL.—One channel at all stages. Both banks high, clean, and do not overflow. 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 since April 25, 1915: 14.48 feet at 8 a. m. June 4; minimum, 9.40 feet at 6 p. m. September 21.

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.

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—Flow may be affected at times by the manipulation of the pool above dam 5, about 9.5 miles above dam 4.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Little Kanawha River at Lock 4, Palestine, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 20	Ellsworth and Frosch	9.68	113
21	....do	9.70	136
Sept. 29	B. J. Peterson	9.76	161

Discharge measurements of leakage of upper gates, Lock No. 4, Little Kanawha River at Palestine, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 20	Ellsworth and Frosch	9.7	9.0
Sept. 29	B. J. Peterson	9.74	13.4

Discharge measurements of leakage of lower gates, Lock No. 4, Little Kanawha River at Palestine, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 20	Ellsworth and Frosch	9.7	23
Sept. 29	B. J. Peterson	9.72	33

Daily gage height, in feet, of Little Kanawha River at Lock 4, Palestine, W. Va., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	11.12	10.80	10.14	11.28	11.22	16	.....	9.72	11.12	11.02	11.00	9.80
2	.....	10.56	10.55	10.72	11.22	11.22	17	.....	9.74	11.15	11.18	10.80	9.73
3	.....	10.35	12.12	11.10	11.40	11.14	18	.....	9.74	10.31	11.08	10.92	9.76
4	.....	10.20	14.46	11.06	12.60	11.52	19	.....	9.68	10.18	11.25	10.92	9.91
5	.....	10.08	12.22	11.03	12.05	13.35	20	.....	9.68	9.90	11.24	10.98	9.88
6	.....	10.00	11.12	11.11	11.45	11.65	21	.....	9.70	9.87	11.18	10.91	9.68
7	.....	9.92	10.68	11.08	11.20	11.42	22	.....	9.81	9.82	11.02	10.92	11.54
8	.....	9.90	10.55	11.05	11.15	12.08	23	.....	9.81	9.80	10.88	10.96	10.80
9	.....	9.86	10.38	11.27	11.00	11.89	24	.....	10.08	9.80	10.90	10.96	10.49
10	.....	9.85	10.21	11.18	11.00	10.88	25	10.98	10.26	9.70	10.92	10.98	10.39
11	.....	9.82	10.10	11.12	11.05	10.61	26	10.62	10.14	9.66	10.90	11.12	10.08
12	.....	9.80	10.32	11 30	11.12	10.42	27	10.36	10.44	9.80	10.83	11.18	10.02
13	.....	9.77	10.48	11.04	11.15	10.08	28	10.32	10.28	9.96	10.89	11.32	9.88
14	.....	9.72	10.22	11 04	11.00	9.90	29	10.86	10.29	10.10	10.90	11.20	9.82
15	.....	9.71	10.60	10.98	11.00	9.88	30	11.26	10.56	10.16	10.93	11.19	9.70
							31	.....	11.04	.....	11.55	11.14	.....

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 to September 30, 1915.

GAGE.—Vertical staff on right bank; read twice daily, to hundredths, 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. Left bank high, steep, wooded; does not overflow. Right bank steep, wooded; overflows at high stages. Bed of stream rock and mud. Control probably fairly permanent. Point of zero flow, gage height, 0.6 ± 0.1 foot.

EXTREMES OF STAGE.—Maximum stage recorded during the year, 11.76 feet at 6 a. m. May 30; minimum stage recorded, 1.50 feet at 7 p. m. June 28, at 6 a. m. June 29, at 6 a. m. July 2, and at 7 p. m. July 24.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of South Fork of Hughes River at Macfarlan, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 15	Ellsworth and Frosch	1.74	12.2	May 22	A. E. Frosch	2.29	30.6
18	C. E. Ellsworth	1.65	9.4	Sept. 27	B. J. Peterson	2.41	29.9

Daily gage height, in feet, of South Fork of Hughes River at Macfarlan, W. Va., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	3.40	1.59	1.76	2.85	16	.....	2.67	1.94	1.58	2.50
2	.....	3.04	1.56	1.76	2.55	17	1.67	2.63	3.82	1.58	2.72
3	.....	8.92	1.60	1.70	2.90	18	1.65	2.34	2.62	2.20	3.30
4	.....	5.26	1.60	1.68	6.65	19	1.63	2.15	2.59	2.72	5.09
5	.....	3.53	1.61	1.64	6.75	20	1.64	2.00	2.22	2.25	4.73
6	.....	3.06	1.60	1.60	5.62	21	1.70	1.92	2.20	1.84	3.46
7	.....	2.65	1.59	1.60	4.15	22	1.97	1.78	2.02	1.85	3.17
8	.....	2.56	1.62	1.58	5.05	23	3.58	1.72	1.71	1.85	2.90
9	.....	2.37	1.58	1.59	3.52	24	3.03	1.67	1.51	1.92	2.67
10	.....	2.26	1.70	1.60	3.24	25	2.48	1.60	1.71	4.42	2.53
11	.....	2.10	1.66	1.59	3.08	26	2.29	1.58	1.60	2.87	2.46
12	.....	2.09	1.67	1.58	2.83	27	2.46	1.55	1.57	2.57	2.41
13	.....	2.03	1.60	1.60	2.80	28	2.54	1.52	1.58	2.39	2.40
14	.....	2.00	1.60	1.60	2.75	29	2.49	1.51	1.64	2.80	2.37
15	.....	2.05	1.61	1.60	2.57	30	8.68	1.56	1.72	3.92	2.30
						31	4.72	.....	1.77	3.50	.....

HUGHES RIVER AT CISKO, W. VA.

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

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

RECORDS AVAILABLE.—May 29 to Sept 30, 1915.

GAGE.—Vertical and inclined staff on right bank; read twice daily, to hundredths, 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. Left bank high, steep, and does not overflow; right bank clean, fairly steep, overflows at gage height of about 27 feet. Bed of river is sand, gravel, mud, and boulders; control is probably permanent. Floods in Ohio River producing gage heights of approximately 40 feet or higher at Parkersburg will probably cause backwater at Cisko. Point of zero flow, gage height, 1.1 ± 0.3 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 12.40 feet at 7 a. m. May 30; minimum 2.31 feet at 7 a. m., June 28.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Hughes River at Cisko, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 22	Ellsworth and Frosch..	4.96	631	May 28	Ellsworth and Forsch..	3.66	194
23	C. E. Ellsworth.....	6.50	1,380	Sept. 28	B. J. Peterson.....	3.00	67.9
24	Ellsworth and Frosch..	4.32	372				

Daily gage height, in feet, of Hughes River at Cisko, W. Va., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	4.55	3.18	3.22	4.15	16	.....	4.6	5.3	2.40	3.00
2	.....	4.0	4.15	2.94	3.6	17	.....	4.05	7.6	2.54	2.93
3	.....	9.2	3.6	2.76	3.4	18	.....	3.65	5.7	2.56	3.3
4	.....	6.7	3.14	2.95	5.5	19	.....	3.30	4.2	3.45	9.0
5	.....	4.8	3.4	2.68	8.5	20	.....	3.08	4.35	2.98	5.8
6	.....	4.1	3.3	2.60	7.5	21	.....	2.88	3.65	2.90	4.5
7	.....	3.7	2.91	2.54	5.7	22	.....	2.79	3.22	2.82	4.25
8	.....	3.55	3.09	2.46	5.7	23	.....	2.64	2.96	2.76	3.9
9	.....	3.4	3.95	2.44	4.7	24	.....	2.56	2.82	2.76	3.5
10	.....	3.35	3.35	2.44	4.8	25	.....	2.51	2.70	4.65	3.25
11	.....	3.18	3.13	2.44	4.2	26	.....	2.46	2.61	3.9	3.09
12	.....	3.01	2.96	2.41	3.8	27	.....	2.40	2.56	3.4	3.04
13	.....	2.99	2.82	2.39	3.55	28	.....	2.32	2.49	3.95	3.00
14	.....	2.96	2.68	2.38	3.3	29	3.85	2.38	2.52	3.95	2.96
15	.....	3.6	2.58	2.48	3.13	30	10.6	2.51	2.66	6.6	2.89
						31	5.7	.....	3.18	5.2	.....

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 to September 30, 1915.

GAGE.—Vertical and inclined staff at downstream end of right abutment; read twice daily to hundredths, by Paul B. Casley.

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

CHANNEL AND CONTROL.—Right bank high, steep, and wooded; does not overflow; left bank wooded, overflows at gage height 17 feet. Channel straight about 700 feet above and below station. Ruins of old mill dam 300 feet below gage act as control. Bed of stream rocky with sand deposits near both banks. Point of zero flow, gage height, 2.1 ± 0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 15.1 feet at 7 a. m. September 7; minimum, 3.00 feet at 7 a. m. May 19.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good. Decay and further destruction of mill dam will affect discharge relation.

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

Data inadequate for determining daily discharge.

Discharge measurements of Hocking River at Athens, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 3	Ellsworth and Frosch	3.38	238
4	....do	3.37	225
Sept. 30	B. J. Peterson	3.73	378

Daily gage height, in feet, of Hocking River at Athens, Ohio, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	5.3	8.3	3.5	4.25	16	3.1	13.4	6.2	4.8	4.0
2	.....	4.9	6.8	3.55	4.05	17	3.05	9.0	7.2	4.35	4.1
3	3.4	8.6	6.3	3.5	4.55	18	3.1	7.2	5.8	4.9	3.95
4	3.35	6.7	7.2	4.1	5.5	19	3.0	6.0	4.9	4.9	9.8
5	3.3	5.6	6.7	4.45	9.1	20	3.15	5.3	4.25	4.2	8.2
6	3.35	4.9	6.3	3.9	14.1	21	5.3	4.7	4.0	4.1	6.4
7	3.3	4.4	5.4	3.5	14.2	22	5.7	4.4	3.85	4.65	5.5
8	3.4	4.3	6.3	3.7	10.6	23	7.2	4.1	3.7	5.2	4.65
9	3.45	4.15	7.6	6.6	7.7	24	5.2	3.95	3.6	5.2	4.25
10	3.3	3.95	6.3	4.5	6.4	25	4.55	3.8	3.5	9.9	4.1
11	3.3	4.25	5.5	4.0	5.5	26	4.45	3.7	3.5	9.0	3.95
12	3.25	4.2	5.5	11.2	5.2	27	4.55	3.6	3.5	6.1	3.85
13	3.15	4.45	5.5	11.8	4.65	28	4.2	3.55	3.45	4.9	3.95
14	3.2	5.1	4.7	7.2	4.35	29	5.8	3.5	3.5	4.6	3.85
15	3.1	9.9	4.25	6.6	4.15	30	8.8	5.9	3.9	4.8	3.75
						31	6.4	.....	3.7	4.6	.....

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 about 4 miles from Crumpler, Ashe County.

DRAINAGE AREA.—325 square miles.

RECORDS AVAILABLE.—August 12, 1908, to September 30, 1915.

GAGE.—Chain gage attached to trees on left bank; read daily, morning and evening, to hundredths, 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, 5.58 feet at 6 p. m., September 5. Minimum stage recorded, 0.98 foot October 1–3.

WINTER FLOW.—Ice rarely forms in sufficient quantity to affect gage readings.

ACCURACY.—Gage-height record very reliable.

Data insufficient for estimates of discharge.

The following discharge measurements were made by wading by Mathers and Morgan:

October 11, 1914: Gage height, 1.00 feet; discharge, 214 second-feet.

October 12, 1914: Gage height, 0.98 foot; discharge, 217 second-feet.

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.98	1.22	4.0	1.9	2.45	1.9	1.65	1.55	1.9	1.40	1.10	1.95
2	.98	1.20	4.3	1.85	3.5	1.85	1.6	1.50	2.1	1.40	1.32	1.65
3	.98	1.20	3.4	1.8	2.7	1.8	1.6	1.55	1.9	1.34	1.33	1.65
4	1.02	1.20	3.7	1.75	2.4	1.8	1.6	1.7	1.7	1.41	1.38	2.1
5	1.38	1.20	4.9	1.7	2.25	1.9	1.6	1.65	1.6	1.65	1.30	4.8
6	1.40	1.19	3.5	2.05	2.25	1.9	1.6	1.50	1.55	1.50	1.24	3.7
7	1.18	1.18	2.8	3.4	2.2	1.9	1.6	1.50	1.50	1.44	1.20	2.5
8	1.10	1.16	2.5	2.5	2.1	1.9	1.6	1.75	1.48	1.34	1.16	2.15
9	1.10	1.24	2.35	2.2	2.05	1.8	1.6	1.65	1.42	1.27	1.14	1.95
10	1.06	1.20	2.15	2.0	2.0	1.8	1.55	1.55	1.40	1.33	1.16	1.9
11	1.02	1.20	2.05	2.0	2.0	1.75	1.65	1.48	1.39	1.30	1.23	1.8
12	1.00	1.16	1.95	2.5	1.95	1.8	1.8	1.55	1.44	1.29	1.8	2.0
13	1.00	1.14	1.95	2.35	1.9	1.75	1.7	1.6	1.37	1.29	1.65	1.9
14	1.16	1.16	1.9	2.1	1.9	1.7	1.6	1.50	1.26	1.32	1.48	2.1
15	1.95	2.4	2.1	2.0	2.0	1.7	1.55	1.47	1.55	1.30	1.44	1.95
16	4.7	2.35	1.8	1.95	2.25	1.7	1.55	1.50	1.8	1.27	1.38	1.75
17	2.45	2.0	1.8	2.1	2.05	1.75	1.55	1.46	1.9	1.19	1.55	1.65
18	1.8	1.6	1.85	2.6	2.0	1.7	1.50	1.44	1.65	1.33	1.43	1.7
19	1.65	1.48	1.8	3.0	1.95	1.7	1.50	1.40	1.6	1.36	1.55	1.8
20	1.55	1.40	1.9	2.6	1.9	1.7	1.48	1.45	1.5	1.6	1.6	1.65
21	1.46	1.30	2.0	2.3	1.85	1.7	1.48	1.50	1.46	1.9	2.1	1.65
22	1.40	1.47	1.95	2.2	1.8	1.7	1.50	1.40	1.46	1.6	1.9	1.65
23	1.36	1.55	1.85	2.1	1.8	1.65	1.55	1.47	1.38	1.6	1.6	1.55
24	1.55	1.49	1.7	2.15	2.35	1.6	1.7	1.75	1.34	1.75	1.44	1.50
25	1.5	1.36	2.3	2.2	2.3	1.6	1.65	1.6	1.30	1.43	1.36	1.48
26	1.45	1.38	2.7	2.15	2.05	1.6	1.55	1.44	1.28	1.32	1.30	1.47
27	1.40	1.32	2.45	2.05	1.95	1.6	1.50	1.40	1.28	1.28	1.44	1.46
28	1.30	1.33	2.05	2.0	1.9	1.6	1.9	1.41	1.28	1.24	2.0	1.50
29	1.26	1.37	2.05	1.95	.....	1.6	1.7	1.47	1.26	1.22	2.15	1.8
30	1.24	2.6	2.2	1.9	.....	1.6	1.65	1.75	1.32	1.19	2.0	1.9
31	1.24	.....	2.0	1.85	.....	1.6	.....	1.7	.....	1.18	1.95	.....

NEW RIVER AT RADFORD, VA.

LOCATION.—At toll highway bridge near the Norfolk & Western Railway station at Radford, Montgomery County, 1½ miles below Norfolk & Western Railway bridge and 6 miles below mouth of Little River.

DRAINAGE AREA.—2,720 square miles.

RECORDS AVAILABLE.—August 1, 1898, to July 15, 1906; May 6, 1907, to September 30, 1915, when station was discontinued.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, by R. B. Harvey.

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

CHANNEL AND CONTROL.—Practically permanent. Point of zero flow determined by leveling July 17, 1911; gage height, 1 foot ±0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.35 feet at 4.30 p. m. December 5; discharge, 38,700 second-feet. Minimum stage recorded, 3.00 feet at 6 p. m. October 1; discharge, 660 second-feet.

Maximum stage of which there is any record, 37.4 feet September 15, 1879, according to United States Weather Bureau.

WINTER FLOW.—Discharge relation only occasionally affected by ice.

DIVERSIONS.—None.

REGULATION.—Operation of power plants about 50 miles above station may slightly affect flow.

ACCURACY.—Rating curve is well defined, but records of discharge for low stages are apparently only fair, as chain of gage is approximately 90 feet long, which makes it difficult to obtain accurate gage readings. Station at Eggleston was established to replace this station.

The following discharge measurements were made by Mathers and Morgan:
October 5, 1914: Gage height, 3.21 feet; discharge, 1,040 second-feet.
October 23, 1914: Gage height, 3.61 feet; discharge, 1,850 second-feet.

Daily discharge, in second-feet, of New River at Radford, Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	868	1,780	10,400	8,170	6,300	5,270	3,470	830	3,630	2,150	1,900	5,270
2	925	1,100	14,000	6,720	21,000	4,930	3,630	2,850	6,300	2,150	1,660	4,270
3	868	1,480	13,600	5,270	16,100	4,930	3,630	2,850	6,640	2,150	1,540	4,470
4	982	1,780	11,600	4,930	11,200	4,600	3,630	2,850	5,270	2,420	1,610	3,790
5	1,300	1,570	38,400	4,270	9,230	4,600	3,950	2,850	4,270	2,280	1,900	10,800
6	2,280	1,640	20,100	4,270	8,850	5,270	3,790	1,780	3,790	2,700	1,900	14,000
7	1,900	1,450	12,000	33,200	8,100	5,950	3,470	1,780	3,470	2,150	1,780	12,400
8	2,020	1,140	8,850	16,500	7,360	5,950	3,470	830	3,160	1,900	1,780	6,640
9	2,150	1,060	7,000	10,000	6,640	5,270	3,470	3,000	2,700	1,780	1,900	5,270
10	1,540	1,780	6,300	7,720	6,300	4,930	3,630	3,000	2,560	1,900	1,780	4,440
11	868	1,540	5,270	7,000	5,950	4,930	3,470	2,700	2,420	1,900	1,900	3,950
12	982	1,780	4,930	9,230	5,610	5,270	4,440	3,000	2,420	1,640	3,310	4,440
13	1,260	1,660	4,270	11,200	5,610	4,930	4,270	3,310	2,280	1,780	3,310	4,270
14	1,020	1,660	4,440	8,850	5,270	4,600	4,110	3,630	2,420	1,780	2,280	4,930
15	1,140	1,780	3,630	7,720	5,270	4,600	3,790	3,470	2,700	2,020	2,150	4,600
16	7,360	6,640	2,560	7,360	6,640	4,440	3,630	2,850	3,790	1,780	2,700	4,600
17	11,200	4,600	2,850	7,000	6,300	4,600	3,470	2,560	4,270	1,900	4,930	4,930
18	4,930	3,470	3,000	9,620	5,610	4,930	3,160	2,420	3,470	2,020	3,950	4,270
19	3,160	2,700	3,310	12,000	5,270	4,600	3,310	2,280	2,850	1,660	2,560	3,790
20	2,700	2,280	4,600	11,200	4,930	4,600	3,310	2,280	2,280	1,660	2,420	2,700
21	2,150	1,900	6,300	9,230	4,930	4,440	3,000	2,560	2,280	1,900	2,850	3,000
22	2,020	1,900	8,470	7,000	4,600	4,440	3,000	2,560	2,280	1,900	3,160	2,420
23	1,900	1,900	7,000	6,640	4,600	3,630	3,000	2,700	2,150	1,900	2,700	2,150
24	2,020	2,020	5,610	6,640	6,300	4,110	3,310	5,270	2,150	2,700	2,700	2,420
25	2,150	2,150	5,610	7,360	10,000	4,110	3,160	4,110	2,150	2,280	2,420	2,420
26	2,150	2,150	10,000	8,100	7,720	3,950	3,310	3,310	2,020	2,020	2,150	2,150
27	2,020	2,150	8,850	7,360	6,300	3,950	3,000	2,850	1,610	2,020	2,280	2,150
28	1,780	2,150	6,300	6,640	5,950	3,950	3,000	2,700	1,200	1,900	3,000	2,150
29	1,780	1,780	6,300	6,300	.....	3,950	1,660	2,700	2,020	1,900	4,110	2,280
30	1,660	2,020	8,470	5,950	.....	3,630	1,780	3,630	2,150	1,660	5,270	2,150
31	1,780	.....	9,620	5,610	.....	3,470	.....	3,310	.....	1,900	5,270	.....

NOTE.—Discharge determined from a rating curve well defined between 830 and 37,000 second-feet. Open-water rating curve used throughout the year.

Monthly discharge of New River at Radford, Va., for the year ending Sept. 30, 1915.

[Drainage area, 2,720 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	11,200	868	2,290	0.842	0.97	A.
November	6,640	1,060	2,100	.772	.86	A.
December	38,400	2,560	8,500	3.12	3.60	A.
January	33,200	4,270	8,680	3.19	3.68	A.
February	21,000	4,600	7,430	2.73	2.84	A.
March	5,950	3,470	4,610	1.69	1.95	A.
April	4,440	1,660	3,380	1.24	1.38	A.
May	5,270	830	2,800	1.03	1.19	A.
June	6,640	1,200	3,020	1.11	1.24	A.
July	2,700	1,640	1,990	.732	.84	A.
August	5,270	1,540	2,680	.985	1.14	A.
September	14,000	2,150	4,570	1.68	1.87	A.
The year	38,400	830	4,320	1.59	21.56	

Days of deficiency in discharge of New River at Radford, Va., for the years ending Sept. 30, 1898–1915.

Discharge in second-feet.	Days of deficient discharge.								
	1898[a]	1898–99	1899–1900	1900–1	1901–2	1902–3	1903–4	1904–5	1905–6[b]
120	.....	.....	0	.....	.....	.....	.....	.....	.....
250	.....	.....	5	0	.....	.....	.....	.....	.....
500	.....	0	15	1	.....	.....	0	.....	.....
700	.....	2	21	3	.....	.....	4	0	.....
900	.....	5	48	5	.....	.....	9	13	.....
1,100	.....	10	68	6	0	0	15	43	0
1,300	.....	12	94	6	3	1	34	71	2
1,500	.....	14	101	7	8	5	64	84	23
1,700	.....	32	120	16	25	15	99	113	41
1,900	.....	32	120	16	25	15	99	113	41
2,100	0	39	125	19	45	37	141	152	57
2,300	1	45	139	27	62	62	173	175	71
2,600	3	59	153	35	84	77	200	209	101
2,900	7	74	162	46	100	92	225	239	132
3,200	17	83	171	60	115	115	251	253	144
3,600	29	106	183	99	143	155	297	279	180
4,000	36	134	203	118	160	177	311	286	195
4,500	42	164	228	129	182	194	322	288	211
5,000	48	211	268	163	233	227	335	303	234
6,000	48	234	290	188	263	253	345	316	244
7,000	50	256	303	219	298	300	355	331	260
9,000	57	304	336	258	319	324	361	346	269
12,000	57	319	351	283	332	339	363	353	282
16,000	58	339	358	317	348	353	365	357	286
20,000	59	354	362	330	355	359	366	360	286
30,000	61	360	365	352	358	361	.....	363	287
50,000	.....	365	.....	357	360	365	.....	364	288
70,000	.....	.....	.....	362	362	.....	.....	364	.....
90,000	.....	.....	.....	362	364	.....	.....	364	.....
120,000	.....	.....	.....	365	365	.....	.....	365	.....

Discharge in second-feet.	Days of deficient discharge.								
	1906–7[c]	1907–8	1908–9	1909–10	1910–11	1911–12[d]	1912–13	1913–14	1914–15
120	.....	.....	.....	.....	.....	.....	.....	.....	.....
250	.....	.....	.....	.....	.....	.....	.....	.....	.....
500	.....	.....	.....	.....	0	.....	.....	0	.....
700	.....	.....	.....	.....	7	.....	.....	1	0
900	.....	.....	0	0	21	.....	0	10	5
1,100	.....	.....	1	1	43	.....	1	42	10
1,300	.....	.....	4	7	60	.....	14	60	15
1,500	0	0	7	42	91	.....	34	75	18
1,700	5	8	17	76	118	.....	67	102	34
1,900	5	8	17	103	159	.....	109	125	53
2,100	20	23	30	147	190	.....	148	168	85
2,300	38	42	46	165	199	.....	175	200	121
2,600	53	62	62	207	218	.....	205	212	137
2,900	77	84	77	243	233	.....	226	229	160
3,200	87	100	84	262	250	.....	252	250	176
3,600	102	135	128	288	275	.....	277	264	197
4,000	110	163	153	301	292	.....	298	285	221
4,500	111	182	186	311	307	.....	308	303	243
5,000	119	223	223	325	314	.....	318	320	270
6,000	126	253	258	338	327	.....	327	340	296
7,000	131	296	296	347	340	.....	331	347	316
9,000	137	327	330	355	349	.....	346	358	338
12,000	139	345	351	358	359	.....	352	363	353
16,000	143	353	355	360	362	.....	358	365	359
20,000	144	358	360	362	364	.....	359	.....	361
30,000	145	364	364	365	365	.....	368	.....	363
50,000	147	366	365	.....	.....	.....	365	.....	365
70,000	148	.....	.....	.....	.....	.....	.....	.....	.....
90,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
120,000	.....	.....	.....	.....	.....	.....	.....	.....	.....

[a] Aug. 1 to Sept. 30, 1898. [b] Oct. 1, 1905, to July 15, 1906. [c] May 6 to Sept. 30, 1907.
[d] No record prepared for the year ending Sept. 30, 1912, because of uncertainty in the estimates of daily discharge for periods in January and February, when the discharge was affected by ice.

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, 1915.

GAGE.—Chain gage attached to downstream side of bridge, read morning and evening, to hundredths, 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 DISCHARGE.—Maximum stage recorded during year, 14.2 feet at 5 p. m. December 5 (discharge, 39,800 second-feet); minimum stage, 911 second-feet October 1, 3, and 11, estimated by comparison with New River at Radford. The flood of 1878 reached a stage represented by 40 feet on present gage.

WINTER FLOW.—Discharge relation affected by ice during periods of extremely cold weather.

ACCURACY.—Results good.

Discharge measurements of New River at Eggleston, Va., during 1911 and the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
1911.		*Feet.*	*Sec.-ft.*
July 17	Horton and Bailey	3.30	1,560
1914.			
Oct. 22	Mathers and Morgan	3.76	2,250

Daily discharge, in second-feet, of New River at Eggleston, Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	911	1,700	7,380	7,950	5,870	5,390	3,630	3,240	3,430	2,160	2,000	5,160
2	971	1,310	13,500	6,600	26,800	5,160	3,630	3,050	5,870	2,000	1,500	4,480
3	911	1,430	15,000	5,630	18,500	5,160	3,630	2,860	6,850	1,560	1,560	3,630
4	1,030	1,430	10,200	4,930	12,700	5,160	3,430	3,050	5,630	1,560	1,560	4,040
5	1,360	1,700	34,500	4,700	9,550	5,160	3,430	3,050	4,700	2,160	2,160	11,300
6	2,390	1,630	23,400	4,700	8,880	5,160	3,630	3,050	3,830	3,050	2,320	26,800
7	1,990	1,430	13,800	31,500	8,560	5,630	3,630	3,050	3,430	3,050	2,000	13,800
8	2,120	1,430	10,600	21,800	7,660	5,870	3,430	2,860	3,240	3,050	1,700	6,110
9	2,250	1,260	7,380	11,600	6,850	5,160	3,430	3,240	3,050	2,670	1,430	5,630
10	1,610	1,310	6,350	4,930	6,110	4,930	3,430	3,240	3,240	2,160	1,560	4,700
11	911	1,500	5,630	6,850	5,870	5,160	3,430	3,050	2,860	2,000	2,000	4,040
12	1,030	1,700	5,390	8,250	5,630	5,160	3,830	2,860	2,670	1,560	2,320	4,040
13	1,320	1,500	5,160	12,700	5,390	5,390	4,260	3,050	2,670	1,850	3,830	4,480
14	1,070	1,430	4,480	9,550	5,160	4,700	4,040	3,430	2,160	2,000	3,430	5,160
15	1,190	1,780	3,810	7,950	5,160	4,480	3,830	3,430	3,240	1,700	3,240	4,480
16	7,720	4,930	2,690	7,950	5,870	4,480	3,630	2,860	3,430	1,700	2,160	4,040
17	11,700	5,160	2,990	8,560	6,350	5,390	3,430	2,670	4,260	2,000	4,260	3,630
18	5,170	3,830	3,150	8,880	5,870	5,160	3,240	3,430	3,630	2,000	4,480	3,630
19	3,310	3,050	3,480	12,000	5,390	5,160	3,050	3,050	3,240	1,560	2,860	3,240
20	2,830	2,860	4,830	12,000	4,930	4,480	3,240	2,320	2,670	1,850	2,490	3,050
21	2,670	2,160	6,620	9,550	5,390	4,480	3,050	2,490	2,320	2,000	2,490	3,240
22	2,160	1,780	8,890	7,380	4,700	4,260	3,050	2,670	2,490	2,320	6,600	3,050
23	2,000	1,850	7,350	6,600	4,700	4,260	3,050	3,430	2,670	2,490	3,830	2,670
24	1,850	2,000	5,900	6,600	5,630	4,040	3,050	3,630	2,000	3,050	3,050	2,490
25	2,000	2,000	5,900	6,850	10,200	4,040	3,050	4,260	2,000	2,160	2,670	2,320
26	2,000	2,000	10,500	7,660	8,250	3,830	3,050	3,830	2,000	1,850	2,320	2,160
27	2,320	1,850	9,290	7,660	6,600	3,830	3,240	3,050	1,850	2,160	2,160	1,700
28	2,000	2,160	6,620	6,600	5,870	14,200	2,860	3,050	1,430	1,850	3,050	2,490
29	1,850	1,850	6,620	6,110	.....	3,630	3,050	2,860	1,430	1,560	3,430	2,320
30	1,700	1,700	8,890	5,630	.....	4,700	3,240	3,430	2,000	1,430	5,390	2,320
31	1,700	.....	9,550	5,390	.....	3,830	.....	3,430	.....	1,430	5,390	.....

NOTE.—Discharge determined from a rating curve well defined between 1,200 and 14,000 second-feet, fairly well defined between 14,000 and 21,000 second-feet, and poorly defined at higher stages. Gage not read October 1–20; discharge estimated from the flow at Radford, Va. Discharge relation was affected by ice December 15–30; discharge estimated from the flow at Radford.

Monthly discharge of New River at Eggleston, Va., for the year ending Sept. 30, 1915.

[Drainage area, 2,920 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	11,700	911	2,390	0.784	0.90	C.
November	5,160	1,260	2,060	.705	.79	A.
December	34,500	2,690	8,700	2.98	3.44	C.
January	31,500	4,700	8,870	3.04	3.50	B.
February	26,800	4,700	7,800	2.67	2.78	B.
March	14,200	3,630	5,080	1.74	2.01	A.
April	4,260	2,860	3,400	1.16	1.29	A.
May	4,260	2,320	3,130	1.07	1.23	A.
June	6,850	1,430	3,140	1.08	1.20	A.
July	3,050	1,430	2,060	.705	.81	A.
August	6,600	1,430	2,880	.986	1.14	A.
September	26,800	1,700	5,010	1.72	1.92	A.
The year	34,500	911	4,530	1.55	21.01	

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths by C. J. Henry, George Stover, W. H. White. Elevation of the zero of gage, 838.44 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of rock strewn with large boulders which cause boils and eddies at high stages.

EXTREMES OF STAGE.—Maximum stage recorded during year, 38.0 feet at 7.30 a. m. January 8; minimum stage recorded, −0.4 foot October 7.

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

WINTER FLOW.—Discharge relation little if at all affected by ice.

DIVERSIONS.—None.

REGULATION.—There may be some regulation due to operation of power plants at or below Fries, Va.

ACCURACY.—Errors entered into many of the gage readings prior to 1908, particularly before installation of chain gage on November 20, 1903, the original wire gage being frequently many tenths in error. For this reason and because of the difficulty in making accurate measurements, all estimates of discharge heretofore published are only fair. Results for 1915 are considered excellent.

COOPERATION.—Station maintained in cooperation with United States Engineer Corps. Estimates of daily discharge withheld.

Discharge measurements of New River at Fayette, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	Mathers and Morgan...	1.17	2,510	Nov. 10	Mathers and Morgan...	0.31	1,780
Nov. 9	.....do.....	.15	1,710	June 17	Ellsworth and Conklin.	3.78	6,210

Daily gage height, in feet, of New River at Fayette, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0	1.0	1.2	10.2	9.3	6.9	4.1	5.1	3.5	0.5	0.4	3.9
2	0	1.3	4.4	9.4	18.2	6.3	4.1	5.9	3.8	.9	.3	3.6
3	0	1.0	8.7	8.8	28.8	5.4	4.1	5.9	4.6	1.2	.6	3.4
4	− .3	.4	9.0	7.2	27.7	5.3	3.9	6.0	6.7	1.0	.5	3.0
5	− .3	.5	9.6	5.6	18.2	5.6	3.7	5.6	7.4	.7	.4	2.6
6	− .3	.2	23.0	8.0	11.3	5.7	3.5	5.4	6.2	.9	1.4	7.7
7	− .4	.3	12.2	29.5	10.6	6.0	3.6	5.7	4.8	1.4	1.6	11.7
8	+1.0	.4	9.5	37.4	9.6	6.4	3.8	6.2	4.0	2.5	.....	7.8
9	.9	.2	8.3	23.0	9.1	6.4	3.8	5.6	3.5	1.9	1.3	5.5
10	.8	.2	7.6	13.2	7.5	6.0	3.6	5.2	3.1	1.7	.6	4.4
11	.8	.1	6.0	12.0	7.1	6.2	4.0	5.0	2.6	1.5	.4	3.7
12	.7	.2	5.2	11.4	6.8	6.2	3.9	3.2	2.4	1.4	.6	3.3
13	.5	.4	5.0	13.2	6.0	6.4	4.0	2.8	.....	1.1	1.3	3.0
14	.4	.2	5.0	10.8	5.8	5.6	4.2	3.0	1.9	.6	3.2	3.6
15	.4	.5	4.0	11.5	5.7	5.4	4.4	3.2	2.5	1.1	.....	3.3
16	.6	.5	3.6	11.8	8.0	6.0	4.2	3.2	3.4	1.3	2.7	3.3
17	1.1	.8	2.0	12.6	8.8	5.9	4.0	2.7	3.7	1.1	1.9	3.0
18	7.8	3.9	2.0	23.3	7.7	6.0	3.5	2.4	4.2	.9	2.6	2.5
19	5.3	3.1	2.8	13.5	6.8	5.8	3.3	2.3	4.3	.8	3.8	2.0
20	3.0	2.4	4.2	13.4	6.3	5.4	3.2	2.1	3.3	1.0	2.4	2.3
21	2.8	1.8	7.4	12.8	5.4	5.2	3.0	1.9	2.9	1.0	2.1	2.1
22	2.2	1.6	9.0	12.4	5.2	5.0	2.9	2.0	2.2	1.3	2.0	2.0
23	1.9	1.2	8.0	13.9	5.6	4.9	2.8	2.2	1.9	1.4	4.6	2.3
24	1.7	1.0	6.0	13.3	5.8	5.2	2.4	2.2	1.9	1.6	3.0	2.1
25	1.5	.9	6.1	10.8	10.6	5.0	2.7	2.2	1.5	1.8	2.4	2.0
26	1.3	1.2	7.0	10.4	12.0	4.4	3.9	3.5	1.5	1.6	1.7	1.7
27	1.4	1.2	6.2	9.8	9.2	4.4	4.2	3.3	1.0	1.1	1.5	1.7
28	1.4	1.2	6.6	9.4	7.8	4.2	5.0	2.7	.8	.9	1.5	1.5
29	1.3	1.2	9.5	9.6	.....	4.4	6.8	2.5	.7	1.2	1.4	1.2
30	1.0	1.2	11.5	8.3	.....	4.3	5.2	3.3	.3	.8	2.6	1.7
31	1.0	.....	11.2	8.2	.....	4.2	.....	3.3	.....	.6	3.9	.....

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 to September 30, 1915. Upper and lower gages at the lock have been read to tenths daily at 8 a. m. since December, 1887, under the direction of the Corps of Engineers, United States Army.

GAGE.—Upper gage at lock, vertical and inclined staff on right bank, short distance above the upper lock gates. Vertical section fastened to right lock wall; inclined section is at upstream end of paved slope; read twice daily to hundredths by George Meyers, lockmaster, beginning June 22. A chain gage fastened on the downstream handrail near the center of toll bridge at Montgomery is used as a reference for the water surface at bridge for determining depths when it is not possible to sound section.

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. At bridge both banks high and do not overflow; at dam right bank never overflows, but left bank is low and flooded at high stages. Bed of river composed of rock, sand, and mud. The dam at Lock No. 2 is the control for practically 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 the crest of the dam, which is 17.9 feet above the zero of the upper gage.

EXTREMES OF STAGE.—Maximum stage recorded since June 22, 24.62 feet at 6 a. m. September 7; minimum, 18.87 feet at 6 p. m. July 31.

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

WINTER FLOW.—Discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Estimates of daily discharge withheld.

Discharge measurements of Kanawha River at Lock No. 2, Montgomery, W. Va., during the years 1911 to Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1911.		*Feet.*	*Sec.-ft.*	1913.		*Feet.*	*Sec.-ft.*
Feb. 8	Jackson and Bailey	21.60	12,800	Mar. 28	A. H. Horton	39.0	157,000
13	H. J. Jackson	22.60	17,700				
Mar. 7	C. T. Bailey	27.24	53,100	1915.			
10	do	24.75	31,900	June 19	Ellsworth and Conklin	20.91	9,310
				July 27	C. E. Ellsworth	19.43	2,310
1912.							
Mar. 17	Horton and Bailey	30.96	86,700				

Discharge measurements of leakage at Lock No. 2, Kanawha River at Montgomery, W. Va., during the year ending Sept. 30, 1915.

Upper gates.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 22	Ellsworth and Conklin	19.95	192
July 28	C. E. Ellsworth	19.36	166

Lower gates.

June 22	Ellsworth and Conklin	20.00	110

Daily gage height, in feet, of Kanawha River at Lock No. 2, Montgomery, W. Va., for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		19.1	19.2	20.3	16		19.5	19.85	20.15
2		19.2	19.3	20.2	17		19.4	19.8	20.0
3		19.4	19.2	20.15	18		20.0	19.85	19.8
4		19.45	19.5	20.05	19		20.0	20.95	19.75
5		19.35	19.3	20.25	20		19.85	20.15	19.8
6		19.4	19.35	21.9	21		20.3	19.8	19.8
7		19.75	19.45	24.3	22	19.95	20.35	19.65	19.9
8		19.85	19.45	22.6	23	19.8	20.1	20.2	20.05
9		19.85	19.35	21.4	24	19.7	19.85	20.25	19.9
10		19.85	19.25	20.8	25	19.6	19.75	19.9	19.8
11		19.65	19.1	20.4	26	19.4	19.7	19.7	19.7
12		19.6	19.0	20.15	27	19.35	19.45	19.5	19.6
13		19.55	19.25	20.0	28	19.3	19.35	19.4	19.6
14		19.45	19.7	20.1	29	19.25	19.35	19.35	19.6
15		19.25	19.85	20.1	30	19.15	19.2	19.65	19.7
					31		19.05	20.2	

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, 1915.

GAGE.—Staff gage attached to posts on right bank; read daily, morning and evening, to hundredths, 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, 6.64 feet at 5.30 p. m. September 5; minimum stage, 1.18 feet October 1–3 and at 6.30 a. m. October 12. The flood of April 20, 1901, reached a stage represented by about 16.4 feet on present gage.

WINTER FLOW.—Little if at all affected by ice.

ACCURACY.—Gage-height record very reliable.

Data inadequate for estimates of daily discharge.

The following discharge measurement was made by Mathers and Morgan.

October 11, 1914: Gage height, 1.18 feet; discharge, 97 second-feet.

Daily gage height, in feet, North Fork of New River near Crumpler, N. C., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.18	1.41	4.3	2.8	3.2	2.3	2.05	1.94	2.6	1.68	1.92	2.4
2	1.18	1.40	4.8	2.6	4.3	2.2	1.98	1.88	2.65	1.60	1.92	2.1
3	1.18	1.40	3.9	2.45	3.9	2.2	1.97	1.98	2.4	1.56	1.62	2.05
4	1.32	1.40	4.9	2.35	3.3	2.15	1.97	2.2	2.4	1.85	2.05	2.2
5	1.50	1.38	5.9	2.25	3.1	2.25	1.99	2.05	2.15	2.05	1.60	6.6
6	1.34	1.36	4.2	2.5	3.1	2.3	1.92	1.92	2.15	1.94	1.46	4.6
7	1.28	1.34	3.4	4.7	2.9	2.35	2.0	1.95	2.0	1.66	1.42	3.7
8	1.25	1.34	3.1	3.3	2.7	2.2	2.2	2.3	1.96	1.58	1.41	2.7
9	1.28	1.50	2.75	2.9	2.6	2.0	2.1	2.0	1.88	1.70	1.38	2.45
10	1.21	1.52	2.6	2.65	2.5	2.2	2.15	1.93	1.80	1.63	1.43	2.4
11	1.20	1.41	2.45	2.55	2.45	2.15	2.2	1.88	1.74	1.62	1.44	2.1
12	1.18	1.37	2.35	3.5	2.35	2.15	2.65	2.0	1.97	1.64	1.98	2.35
13	1.20	1.36	2.55	2.85	2.3	2.1	2.4	2.3	1.80	2.3	2.4	2.3
14	1.40	1.38	2.35	2.65	2.3	2.1	2.25	2.05	1.90	1.87	1.67	2.8
15	2.15	2.75	2.0	2.8	2.4	2.05	2.15	1.98	2.45	1.70	1.57	2.25
16	3.9	2.5	1.82	2.75	2.6	2.1	2.1	2.0	2.4	1.60	1.48	2.05
17	2.2	2.15	2.05	2.95	2.35	2.15	2.05	1.88	1.96	1.61	1.98	2.05
18	2.05	1.88	2.1	3.5	2.35	2.05	1.98	1.86	1.80	1.91	2.2	2.1
19	1.94	1.86	2.25	3.8	2.25	2.1	1.94	1.81	1.72	1.65	2.45	1.99
20	1.80	1.80	3.0	3.3	2.2	2.05	1.90	1.90	1.68	1.77	2.05	1.88
21	1.68	1.46	2.95	3.0	2.15	2.05	1.90	1.80	1.76	2.2	2.45	1.96
22	1.62	1.94	3.1	2.7	2.2	2.0	1.89	1.71	1.76	1.75	1.98	2.0
23	1.56	1.74	2.65	2.7	2.15	1.94	1.92	1.85	1.62	1.87	1.77	1.82
24	1.72	1.54	2.5	3.1	2.85	2.0	2.05	3.0	1.55	1.82	1.66	1.78
25	1.72	1.60	4.6	3.4	2.75	1.96	1.99	2.2	1.53	1.59	1.60	1.74
26	1.59	1.70	4.2	3.2	2.6	2.1	1.87	1.98	1.53	1.53	1.52	1.70
27	1.53	1.63	3.2	2.9	2.5	2.1	1.82	2.1	1.52	1.48	1.80	1.66
28	1.50	1.60	2.9	2.75	2.4	2.05	2.35	1.97	1.50	1.42	3.3	1.87
29	1.48	1.58	2.9	2.55	.....	2.0	2.35	2.1	1.48	1.40	2.75	2.45
30	1.46	3.60	3.4	2.5	.....	1.99	2.15	2.1	1.54	1.38	2.55	2.8
31	1.42	.....	3.0	2.45	.....	2.05	.....	2.6	.....	1.34	2.35	.....

NOTE.—Discharge relation probably not affected by ice.

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, by J. T. Black.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Permanent; bottom solid rock. Point of zero flow determined by leveling, July 20, 1911, and December 13, 1913; gage height, 0.6 foot ±0.1 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 5.90 feet at 7.20 a. m. January 7; minimum stage, 1.99 feet at 6.25 a. m. October 12, at 6 a. m. August 9, and at 6.30 a. m. August 25.

WINTER FLOW.—Discharge relation affected by ice for short periods.

REGULATION.—Dam and gristmill just above the station. The storage is small, and the miller states that water flows over the dam at all times. The flow is therefore little if at all modified by the operation of the mill.

ACCURACY.—Gage-height record reliable.

Data inadequate for estimates of discharge.

The following discharge measurements were made by wading, by Mathers and Morgan:

October 8, 1914: Gage height, 2.10 feet; discharge, 67 second-feet. Gage height, 2.08 feet; discharge, 60 second-feet.

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.11	2.08	2.82	3.15	3.2	2.70	2.46	2.30	2.48	2.14	2.12	2.28
2	2.08	2.12	3.1	2.96	4.6	2.64	2.42	2.28	2.82	2.10	2.36	2.22
3	2.10	2.16	3.35	2.84	3.9	2.62	2.42	2.27	2.87	2.12	2.18	2.17
4	2.10	2.18	3.35	2.79	3.45	2.60	2.40	2.32	2.80	2.17	2.14	2.38
5	2.04	2.17	4.9	2.72	3.25	2.64	2.38	2.32	2.68	2.32	2.12	3.06
6	2.15	2.16	3.6	2.90	3.2	2.68	2.40	2.30	2.53	2.26	2.08	3.18
7	2.14	2.14	3.15	5.2	3.05	2.84	2.36	2.29	2.44	2.16	2.07	2.69
8	2.12	2.16	2.92	3.95	2.98	2.82	2.38	2.27	2.38	2.14	2.09	2.49
9	2.10	2.06	2.79	3.45	2.85	2.72	2.36	2.24	2.34	2.13	2.00	2.36
10	2.10	2.16	2.70	3.15	2.82	2.83	2.38	2.23	2.29	2.12	2.09	2.30
11	2.08	2.16	2.60	3.05	2.80	2.88	2.38	2.23	2.28	2.07	2.12	2.25
12	2.00	2.16	2.52	3.45	2.76	2.86	2.50	2.28	2.24	2.14	2.26	2.30
13	2.12	2.16	2.50	3.35	2.72	2.78	2.54	2.68	2.18	2.18	2.17	2.26
14	2.11	2.14	2.48	3.15	2.67	2.74	2.50	2.65	2.22	2.17	2.15	2.24
15	2.19	2.28	2.24	3.2	2.70	2.70	2.48	2.48	2.38	2.14	2.02	2.21
16	2.48	2.34	2.46	3.25	2.74	2.74	2.43	2.40	2.50	2.12	1.98	2.16
17	2.38	2.32	2.40	3.25	2.70	2.69	2.42	2.34	2.38	2.12	2.24	2.14
18	2.26	2.23	2.36	3.65	2.67	2.64	2.38	2.34	2.28	2.12	2.16	2.08
19	2.20	2.20	2.38	3.5	2.65	2.64	2.38	2.28	2.22	2.12	2.14	2.18
20	2.16	2.20	2.60	3.25	2.60	2.63	2.37	2.30	2.20	2.12	2.14	2.12
21	2.14	2.05	2.98	3.1	2.59	2.60	2.34	2.28	2.20	2.12	2.10	2.18
22	2.18	2.19	3.35	2.90	2.56	2.60	2.34	2.22	2.20	2.10	2.06	2.14
23	2.16	2.14	2.97	2.90	2.58	2.64	2.33	2.24	2.14	2.17	2.02	2.16
24	2.12	2.15	2.80	3.0	2.92	2.56	2.35	2.44	2.14	2.13	2.13	2.16
25	2.16	2.17	2.95	3.3	3.35	2.54	2.35	2.38	2.14	2.12	2.01	2.13
26	2.14	2.16	3.0	3.35	3.05	2.52	2.32	2.29	2.14	2.06	2.10	2.10
27	2.15	2.14	2.82	3.2	2.86	2.54	2.32	2.32	2.13	2.10	2.11	2.05
28	2.15	2.12	3.05	3.05	2.78	2.53	2.30	2.48	2.10	2.04	2.38	2.12
29	2.16	2.18	2.93	2.94	.....	2.50	2.30	2.37	2.12	2.10	2.42	2.14
30	2.13	2.42	3.45	2.89	.....	2.47	2.30	2.38	2.15	2.00	2.32	2.34
31	2.13	.....	3.45	2.88	.....	2.48	.....	2.37	.....	2.02	2.28	.....

NOTE.—Observer took no notes relative to ice. Discharge relation probably not materially affected by ice.

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, 1915.

GAGE.—Vertical staff fastened to a tree on right bank; read once daily, to hundredths, by K. M. Thomas; after periods of precipitation it is read twice daily.

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

CHANNEL AND CONTROL.—Channel at measuring section subject to change caused by deposits of silt from ore washing. Control probably permanent. Point of zero flow determined by leveling, July 19, 1911; gage geight −0.7 foot±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 4.30 feet at 8 a. m. January 7; minimum, 0.30 foot at 6 p. m. October 2.

WINTER FLOW.—Discharge relation sometimes affected by ice.

ACCURACY.—Records of gage height reliable.

Data inadequate for estimates of discharge.

The following discharge measurements were made by Mathers and Morgan:

October 7, 1914: Gage height, 0.44 foot; discharge, 182 second-feet. Gage height, 0.44 foot; discharge 179 second-feet.

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.31	0.41	1.45	0.96	0.23	1.05	0.85	0.69	0.55	0.74	0.42	1.05
2	.30	.42	1.3	.89	2.8	1.00	.88	.68	1.3	.52	.51	.88
3	.31	.42	.93	.84	1.85	1.00	.91	.70	1.05	.51	.57	.82
4	.39	.41	.94	.80	1.45	1.00	.87	.71	.89	.82	.60	2.5
5	.87	.41	2.8	.76	1.30	1.10	.99	.65	.79	1.2	.72	1.9
6	.51	.39	1.3	1.5	1.45	1.15	.95	.65	.72	.71	.....	1.6
7	.43	.38	1.05	3.6	1.25	1.25	.88	.69	.69	.57	.81	1.15
8	.38	.37	.92	1.65	1.15	1.10	.87	.....	.70	.52	.40	1.00
9	.44	.53	.82	1.30	1.10	1.05	.83	.92	.64	.58	.52	.91
10	.39	.50	.83	1.15	1.05	1.15	.83	.69	.60	.53	.44	.85
11	.33	.44	.81	1.00	1.00	1.10	1.0	.66	.57	.50	.70	.84
12	.31	.40	.75	2.7	1.05	1.05	.90	.63	.62	.50	1.7	1.10
13	.48	.38	.78	1.55	1.05	1.00	.88	.84	.58	.48	1.2	.97
14	.48	.43	.83	1.30	1.00	1.00	.85	.76	.60	.47	.86	.84
15	.44	1.5	.73	1.25	1.10	.98	.84	.70	.96	.46	.63	.78
16	2.4	1.15	1.1	1.10	1.35	.96	.80	.66	.88	.45	.70	76
17	.82	.61	1.1	1.15	1.15	1.05	.80	.61	.65	.46	2.4	.72
18	.64	.53	1.05	1.95	1.05	.96	.77	.60	.59	.46	1.2	.70
19	.45	.51	1.0	1.85	1.00	1.05	.77	.64	.58	.58	.88	.73
20	.51	.61	1.25	1.40	.99	.99	.77	.70	.54	.57	.72	.69
21	.49	.43	1.15	1.10	.98	.96	.76	.66	.54	.60	1.85	.77
22	.47	.70	1.2	1.15	.97	.98	.76	.67	.50	.52	1.00	.68
23	.46	.70	.95	1.10	.96	.94	.85	.80	.49	.50	.80	.66
24	.58	.56	.91	1.15	2.8	.98	.84	1.2	.48	.47	.70	.67
25	.56	.61	1.55	1.05	1.85	.94	.76	.73	.47	.40	.62	.65
26	.51	.59	1.2	1.05	1.50	.93	.75	.66	.46	.39	.61	.63
27	.46	.57	.87	1.00	1.15	.92	.73	.71	.46	.37	.75	.63
28	.43	.50	.84	1.00	1.10	.90	.73	.65	.46	.38	1.30	.68
29	.42	.47	1.0	.95	.....	.88	.72	.72	.44	.35	1.05	.72
30	.42	1.7	1.55	.95	.....	.87	.73	.89	.43	.33	1.50	.77
31	.41	.....	1.15	.99	.....	.88	.....	.71	.....	.32	1.40	.....

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, 1915.

GAGE.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths, by T. A. DeHart.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Probably permanent. Point of zero flow determined by leveling, July 18, 1911, and September 21, 1912; gage height, 1.8 feet ±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 8.05 feet at 10.10 a. m. January 7; minimum stage, 3.10 feet October 1–4.

WINTER FLOW.—Discharge relation affected by ice for short periods.

ACCURACY.—Gage-height records reliable.

Data inadequate for estimates of discharge.

The following discharge measurement was made by Mathers and Morgan:

October 6, 1914: Gage height, 3.47 feet; discharge, 178 second-feet.

Daily gage height, in feet, of Little River near Copper Valley, Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.1	3.2	4.45	3.95	4.5	3.88	3.65	3.52	3.98	3.48	3.38	3.93
2	3.11	3.21	4.3	3.9	6.0	3.82	3.65	3.5	4.75	3.53	3.33	3.70
3	3.1	3.21	3.9	4.0	4.85	3.8	3.72	3.51	4.5	3.54	3.40	3.86
4	3.14	3.21	3.76	3.95	4.5	3.79	3.72	3.68	4.0	3.57	3.56	4.78
5	3.49	3.22	7.0	3.82	4.3	3.92	3.96	3.6	3.82	4.03	3.73	5.38
6	3.51	3.22	4.7	3.9	4.4	4.05	3.78	3.52	3.72	3.86	3.45	5.56
7	3.29	3.21	4.3	7.1	4.2	4.15	3.71	3.61	3.62	3.52	3.29	4.33
8	3.74	3.22	4.05	4.55	4.05	4.05	3.65	3.7	3.61	3.48	3.28	4.00
9	3.7	3.24	3.88	4.45	3.95	3.92	3.65	3.75	3.56	3.48	3.30	3.83
10	3.35	3.35	3.86	4.15	4.0	4.0	3.62	3.6	3.51	3.43	3.40	3.78
11	3.26	3.26	3.82	4.0	3.95	4.1	3.68	3.54	3.49	3.40	3.36	3.68
12	3.19	3.21	3.79	5.3	3.9	4.05	3.98	3.55	3.49	3.38	5.13	4.73
13	3.19	3.22	3.78	4.6	3.9	3.95	3.78	3.85	3.54	3.36	3.88	3.80
14	3.22	3.22	3.78	4.35	3.89	3.95	3.69	3.58	3.51	3.33	3.50	4.13
15	3.3	4.3	3.48	4.3	3.94	3.91	3.62	3.5	3.94	3.33	3.43	3.78
16	5.6	4.15	3.48	4.15	4.2	3.89	3.64	3.46	3.74	3.32	3.46	3.68
17	4.05	3.56	3.8	4.15	3.92	4.0	3.64	3.42	3.82	3.47	3.90	3.63
18	3.55	3.38	3.79	4.45	3.88	4.0	3.59	3.39	3.64	3.42	4.19	3.62
19	3.46	3.38	3.81	4.5	3.82	3.92	3.58	3.4	3.59	3.38	3.63	3.69
20	3.39	3.38	4.1	4.25	3.8	3.9	3.55	3.44	3.55	3.40	3.52	3.63
21	3.36	3.4	4.3	4.05	3.79	3.8	3.58	3.5	3.52	3.47	4.48	3.86
22	3.29	3.45	4.35	4.0	3.79	3.8	3.55	3.48	3.5	3.42	3.76	3.66
23	3.29	3.62	4.6	4.0	3.9	3.8	3.62	3.52	3.48	4.08	3.50	3.54
24	3.3	3.55	4.1	4.05	4.65	3.79	3.69	4.1	3.44	3.67	3.42	3.56
25	3.4	3.42	4.0	3.99	4.55	3.76	3.64	3.88	3.4	3.43	3.38	3.52
26	3.38	3.45	4.15	4.15	4.2	3.75	3.58	3.58	3.38	3.32	3.38	3.48
27	3.29	3.44	3.95	3.96	3.98	3.72	3.54	3.56	3.65	3.28	3.48	3.48
28	3.25	3.32	3.98	3.95	3.92	3.7	3.52	3.59	3.36	3.28	4.66	3.59
29	3.25	3.28	4.05	3.85	.....	3.7	3.6	3.55	3.36	3.23	4.13	3.63
30	3.24	3.75	4.4	3.84	.....	3.66	3.58	3.88	3.44	3.20	3.99	3.66
31	3.22	.....	4.3	3.88	.....	3.68	.....	3.85	.....	3.28	4.23	.....

NOTE.—Ice jammed on riffle below gage on Nov. 21.

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, by J. F. Durham.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.6 feet at 7.40 a. m. January 7; minimum stage, 2.60 feet at 6.40 p. m. August 11.

WINTER FLOW.—Discharge relation probably not affected by ice.

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

Data inadequate for estimates of discharge.

Discharge measurements of Walker Creek at Staffordsville, Va., during the year ending Sept. 30, 1915.

[Made by Mathers and Morgan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 19	3.03	75.4
19	3.03	76.8

Daily gage height, in feet, of Walker Creek at Staffordsville, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.72	2.79	4.52	4.85	5.19	4.31	3.78	3.76	3.51	2.86	2.88	3.33
2	2.77	2.79	5.14	4.61	8.49	4.14	3.72	3.61	3.74	2.93	2.93	3.27
3	2.70	2.81	5.13	4.33	6.61	4.06	3.69	3.61	3.87	2.91	3.23	3.22
4	2.78	2.80	4.74	4.23	5.69	3.95	3.65	3.63	3.84	2.92	3.06	4.13
5	2.78	2.78	8.69	4.05	5.24	4.04	3.59	3.55	3.72	3.08	2.96	6.10
6	2.84	2.77	5.98	4.41	5.11	3.99	3.59	3.51	3.59	3.08	2.89	5.46
7	2.80	2.77	5.19	9.59	4.83	4.05	3.56	3.48	3.51	3.09	2.83	4.55
8	2.94	2.80	4.70	6.69	4.65	4.06	3.49	3.48	3.41	2.97	2.76	4.06
9	2.82	2.77	4.37	5.75	4.45	3.96	3.53	3.41	3.33	2.90	2.78	3.83
10	2.81	2.80	4.11	5.19	4.23	4.21	3.53	3.35	3.23	2.88	2.80	3.68
11	2.82	2.79	3.93	4.84	4.15	4.74	3.61	3.30	3.23	2.86	2.79	3.58
12	2.74	2.76	3.79	5.41	4.04	4.71	3.71	3.34	3.11	2.86	3.46	3.73
13	2.76	2.83	3.74	5.20	3.99	4.63	3.83	3.43	3.10	2.84	3.28	3.55
14	2.95	2.79	3.71	4.84	3.97	4.44	3.80	3.85	3.10	2.82	3.04	3.63
15	2.82	3.04	3.27	5.16	3.95	4.35	3.77	3.65	3.17	2.83	2.89	3.48
16	3.86	3.44	3.37	5.41	4.21	4.31	3.69	3.55	3.47	2.80	2.91	3.35
17	3.70	3.31	3.39	5.55	4.23	4.55	3.64	3.44	3.44	2.82	3.40	3.28
18	3.35	3.14	3.36	6.29	4.15	4.44	3.59	3.39	3.28	2.81	3.48	3.22
19	3.18	3.05	3.47	5.99	4.05	4.37	3.55	3.31	3.19	2.78	3.23	3.20
20	3.05	3.01	3.87	5.38	3.97	4.33	3.53	3.29	3.09	2.87	3.10	3.18
21	3.02	2.87	4.89	4.91	3.88	4.25	3.50	3.29	3.08	2.89	3.10	3.14
22	2.95	2.95	5.59	4.61	3.83	4.20	3.45	3.23	3.07	2.98	3.16	3.16
23	2.93	2.93	4.91	4.44	3.79	4.11	3.45	3.23	2.98	2.93	3.06	3.12
24	2.92	2.93	4.47	4.39	5.21	4.02	3.51	3.28	2.95	3.02	2.97	3.06
25	2.95	2.87	.....	4.56	5.65	3.95	3.49	3.27	2.91	2.96	2.92	3.02
26	2.89	2.91	.....	4.79	5.05	3.94	3.45	3.24	2.88	2.88	2.88	3.00
27	2.88	2.90	.....	4.59	4.67	4.00	3.43	3.23	2.87	2.86	2.93	3.00
28	2.85	2.91	3.89	4.37	4.45	4.02	3.53	3.29	2.84	2.78	3.30	3.00
29	2.88	2.94	4.25	4.27	.....	3.97	4.95	3.29	2.87	2.78	3.74	3.00
30	2.86	3.27	5.61	4.16	.....	3.95	3.94	3.45	2.88	2.74	3.56	3.04
31	2.83	.....	5.41	4.19	.....	3.84	.....	3.55	.....	2.74	3.39	.....

NOTE.—Discharge relation probably not affected by ice.

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, by J. A. Hale.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Practically permanent. Point of zero flow, determined by leveling July 15, 1911; gage height, 1.1 feet ±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.50 feet at 2 p. m. January 7; minimum stage, 1.33 feet at 6.50 a. m. and 5 p. m. November 10.

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

WINTER FLOW.—Discharge relation not affected by ice except for short periods during extremely cold weather.

ACCURACY.—Gage-height records reliable.

Data inadequate for estimates of discharge.

The following discharge measurements were made by Mathers and Morgan:

October 24, 1914: Gage height, 2.52 feet; discharge, 52 second-feet. Gage height, 2.53 feet; discharge, 51 second-feet.

Daily gage height, in feet, of Wolf Creek near Narrows, Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.2.	2.38	2.96	4.35	5.7	3.55	3.34	3.11	3.05	2.46	2.42	2.86
2	2.21	2.35	3.85	4.05	8.0	3.46	3.27	3.06	3.22	2.56	2.43	2.74
3	2.20	2.36	4.35	3.75	6.3	3.38	3.24	3.07	3.33	2.51	2.54	2.69
4	2.24	2.35	3.9	3.6	5.3	3.30	3.17	3.15	3.37	2.52	2.56	2.82
5	2.31	2.36	6.2	3.49	4.8	3.30	3.13	3.09	3.26	2.74	2.50	3.65
6	2.32	2.34	4.8	3.85	4.6	3.34	3.10	3.06	3.16	2.84	2.45	3.90
7	2.30	2.36	4.25	8.8	4.3	3.41	3.09	3.06	3.04	2.66	2.40	3.52
8	2.31	2.35	3.95	5.9	4.1	3.40	3.11	3.05	3.00	2.58	2.38	3.30
9	2.26	2.37	3.7	4.9	3.9	3.28	3.11	3.00	2.96	2.52	2.36	3.06
10	2.25	2.33	3.5	4.4	3.75	3.48	3.09	2.95	2.88	2.51	2.38	2.96
11	2.22	2.34	3.4	4.1	3.65	3.70	3.12	2.90	2.79	2.50	2.40	2.90
12	2.21	2.36	3.29	4.35	3.5	3.7	3.55	2.90	2.73	2.52	2.60	2.81
13	2.21	2.35	3.21	4.15	3.5	3.6	3.55	4.10	2.71	2.48	2.52	2.80
14	2.32	2.36	3.18	3.95	3.42	3.6	3.46	3.60	2.68	2.58	2.46	2.85
15	2.48	2.42	2.92	4.5	3.46	3.5	3.38	3.34	2.68	2.56	2.42	2.76
16	2.94	2.63	2.85	4.8	3.7	3.48	3.30	3.19	2.70	2.52	2.56	2.67
17	3.05	2.73	3.05	4.7	3.65	3.6	3.24	3.07	2.72	2.48	2.58	2.67
18	2.78	2.71	3.00	5.1	3.6	3.5	3.17	2.99	2.72	2.52	2.73	2.72
19	2.76	2.67	2.95	4.9	3.5	3.55	3.11	2.92	2.70	2.52	2.76	2.70
20	2.70	2.62	3.35	4.5	3.42	3.5	3.08	2.86	2.62	2.78	2.64	2.65
21	2.62	2.42	4.05	4.15	3.36	3.49	3.06	2.88	2.59	3.02	2.61	2.69
22	2.54	2.54	4.6	3.8	3.35	3.46	3.01	2.82	2.54	2.94	2.56	2.88
23	2.49	2.56	4.1	3.75	3.28	3.43	3.02	2.82	2.54	2.83	2.52	2.75
24	2.50	2.45	3.85	3.9	3.7	3.4	3.14	3.31	2.52	2.70	2.46	2.68
25	2.44	2.49	4.0	4.05	4.15	3.38	3.08	3.07	2.50	2.62	2.42	2.62
26	2.38	2.50	3.8	4.05	3.9	3.48	3.02	2.95	2.48	2.56	2.36	2.59
27	2.40	2.48	3.4	3.9	3.8	3.6	3.01	3.02	2.45	2.50	2.44	2.58
28	2.48	2.51	3.41	3.8	3.65	3.6	3.03	3.08	2.44	2.46	3.00	2.58
29	2.45	2.50	3.55	3.6	.....	3.55	3.34	3.00	2.43	2.43	3.46	2.59
30	2.45	2.56	5.1	3.46	.....	4.0	3.19	3.10	2.45	2.44	3.18	2.61
31	2.42	.....	4.9	3.6	.....	3.38	.....	3.02	.....	2.44	2.98	.....

NOTE.—Observer took no notes relative to ice; discharge relation probably not materially affected by ice.

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, 1915.

GAGE.—Vertical staff gage in two sections; read daily, morning and evening, to hundredths by W. H. Lilly.

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

CHANNEL AND CONTROL.—Practically permanent. Point of zero flow, determined by levels run August 24, 1910, and November 13, 1913, gage height 0.0 ± 0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 7.4 feet at 5 p. m. February 2; minimum stage, 0.0 foot at 5 p. m. August 10.

WINTER FLOW.—Discharge relation may be affected by ice during parts of December, January, and February.

ACCURACY.—Gage-height record reliable.

Data inadequate for determining daily discharge.

The following discharge measurement was made by J. G. Mathers:

December 2, 1914: Gage height, 1.09; discharge, 50 second-feet.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.74	0.86	1.01	3.20	4.9	2.25	2.0	2.5	1.60	1.06	1.09	1.11
2	.74	.90	1.05	2.60	7.3	2.20	1.94	2.55	1.69	1.02	1.06	1.12
3	.81	.90	1.30	2.25	5.6	2.1	1.88	2.4	1.84	1.02	.96	1.16
4	.81	.85	2.45	2.20	4.3	2.05	1.84	2.05	1.82	1.03	.89	1.21
5	.81	.79	3.6	2.10	3.8	1.98	1.82	2.25	1.75	1.04	.82	1.75
6	.80	.79	3.15	2.55	3.7	1.89	1.73	2.6	1.69	1.07	.55	1.78
7	.82	.79	2.20	6.8	3.6	2.05	1.71	2.85	1.64	1.05	.41	1.69
8	.80	.80	1.82	6.2	3.6	2.20	1.69	3.0	1.64	1.04	.30	1.72
9	.81	.83	1.38	5.10	3.6	2.1	1.62	2.6	1.52	1.29	.21	1.77
10	.88	.88	1.19	3.45	3.4	2.0	1.6	2.3	1.40	1.33	.05	1.69
11	.90	.91	1.19	2.95	2.95	1.96	1.64	2.25	1.34	1.29	.50	1.69
12	.92	.86	1.20	3.10	2.85	1.92	1.62	1.95	1.36	1.25	.88	1.44
13	.91	.84	1.25	4.0	2.9	1.96	1.59	1.79	1.40	1.25	.84	1.20
14	.98	.86	1.26	3.6	2.7	2.0	1.60	1.74	1.41	1.19	.80	1.07
15	1.02	.87	1.31	3.45	2.6	2.15	1.61	1.68	1.48	1.14	.84	.99
16	1.32	.86	1.30	4.0	2.5	2.3	1.63	1.52	1.62	1.10	.86	.97
17	1.49	.86	1.41	4.1	2.4	2.4	1.60	1.46	1.59	1.01	.91	.96
18	1.50	.86	1.43	4.3	2.3	2.35	1.60	1.38	1.52	1.03	.88	.96
19	1.59	.89	1.64	3.6	2.25	2.45	1.61	1.31	1.46	1.09	.83	1.01
20	1.38	.87	2.30	3.4	2.2	2.45	1.56	1.21	1.39	1.30	.85	.98
21	1.28	.90	2.3	3.1	2.1	2.45	1.51	1.19	1.32	1.70	1.54	.96
22	1.04	.88	1.95	3.05	2.0	2.6	1.50	1.12	1.29	1.75	1.42	.91
23	.98	.85	1.72	3.15	2.0	2.5	1.67	1.11	1.31	1.42	1.34	.80
24	.93	.87	1.65	3.2	1.94	2.45	1.94	1.26	1.31	1.39	1.31	.80
25	.90	.90	1.40	3.2	2.25	2.45	1.95	1.35	1.33	1.25	1.24	.80
26	.88	.92	1.40	3.2	2.6	2.55	2.1	1.40	1.29	1.15	1.30	.85
27	.88	.98	1.40	3.2	2.45	2.6	1.98	1.46	1.24	1.08	1.32	.84
28	.85	.97	1.42	3.25	2.35	2.6	1.97	1.40	1.22	1.00	1.31	.87
29	.88	.94	1.90	3.5	.....	2.6	2.2	1.28	1.18	.98	1.26	.88
30	.90	.95	2.65	3.25	.....	2.35	2.45	1.17	1.11	1.01	1.19	.97
31	.90	.....	4.2	3.6	.....	2.15	.....	1.15	.....	1.04	1.12	.....

NOTE.—Gage read to top of ice Dec. 25–27; ice gone out, Dec. 31.

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, by C. H. McCoy.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Probably not permanent. Bed at measuirng section composed of coarse gravel. Point of zero flow, determined by leveling, September 6, 1912; gage height, 2.7 feet ± 0.1 foot; on November 11, 1913, this stage was found to be 2.2 feet ± 0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 13.95 feet at 7 a. m. January 7; minimum stage, 3.10 feet October 1–8.

WINTER FLOW.—Discharge relation may be affected by ice for short periods during December, January, and February.

Data inadequate for estimates of discharge.

The following discharge measurement was made by J. G. Mathers:

November 29, 1914: Gage height, 3.27 feet; discharge, 47 second-feet.

Daily gage height, in feet, Greenbrier River near Marlinton, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.05	3.24	3.99	4.85	5.0	4.55	3.96	4.40	4.8	3.26	3.36	3.78
2	3.05	3.24	4.18	4.85	10.6	4.36	3.90	4.34	4.8	3.45	4.10	3.66
3	3.05	3.24	4.24	4.7	8.4	4.30	3.85	4.10	6.4	3.41	4.75	3.62
4	3.05	3.24	4.5	4.14	7.8	4.22	3.82	4.01	6.1	3.40	4.31	3.67
5	3.05	3.24	4.7	4.12	7.7	4.13	3.80	3.94	5.8	3.48	4.12	3.98
6	3.05	3.24	4.8	4.6	6.4	4.02	3.79	3.88	5.35	3.60	3.65	3.83
7	3.05	3 24	5.05	11.6	4.5	4.08	3.78	3.81	4.46	3.59	3.78	3.73
8	3.05	3.24	4.8	7.3	5.2	4.01	4.06	3.75	4.32	3.46	3.66	3.66
9	3.15	3.24	4.7	5.8	4.8	4.02	4.36	3.74	4.22	3.55	3.55	3.60
10	3.15	3.22	4.65	5.6	4.32	4.01	4.34	3.66	3.95	3.50	3.50	3.52
11	3.15	3.22	4.31	5.5	4.46	3.98	4.36	3.61	3.82	3.42	3.49	3.48
12	3.15	3.21	4.04	4.85	4.48	4.0	4.41	3.61	3.78	3.38	4.7	3.42
13	3.25	3.21	3.98	4.85	4.48	4.04	4.36	3.69	3.72	3.36	4.6	3.40
14	3.25	3.21	3.90	4.6	4.85	4.13	4.24	3.69	3.77	3.33	4.30	3.41
15	3.67	3.42	3.74	4.5	6.5	4.21	4.14	3.68	4.02	3.30	4.12	3.34
16	3.65	3.44	3.64	4.48	6.6	4.22	4.05	3.67	4.21	3.30	4.10	3.30
17	3.65	3.42	3.60	5.25	5.7	4.23	3.99	3.64	4.34	3.30	3.94	3.25
18	3.64	3.40	3.60	9.1	5.2	4.15	3.94	3.56	4.8	3.45	4.6	3.27
19	3.64	3.39	3.80	9.6	4.8	4.10	3.90	3.51	4.6	3.46	4.20	3.62
20	3.56	3.39	4.21	6.9	4.55	4.11	3.86	3.54	4.1	3.40	3.98	4.26
21	3.50	3.37	4.9	5.6	4.40	4.07	3.79	3.74	3.82	3.60	3.94	4.28
22	3.29	3.34	5.25	5.25	4.36	4.0	3.75	3.71	3.71	3.76	4.00	4.44
23	3.24	3.31	4.85	4.85	4.34	3.94	3.71	3.74	3.72	3.56	3.94	4.11
24	3.24	3.28	4.8	5.2	6.2	3.85	3.70	3.81	3.58	3.50	3.83	3.86
25	3.34	3.26	4.5	5.05	6.5	3.78	3.80	3.78	3.50	3.49	3.72	3.76
26	3.34	3.26	4.48	5.0	5.7	3.78	3.80	3.77	3.44	3.44	3.63	3.56
27	3.29	3.26	4.36	5.0	5.1	3.78	3.82	3.72	3.38	3.40	3.50	3.28
28	3.24	3.27	4.34	4.65	4.85	3.90	3.91	3.62	3.36	3.33	3.60	3.40
29	3.24	3.24	4.34	4.32	.....	4.04	4.48	3.60	3.35	3.30	3.94	3.54
30	3.24	3.65	4.9	4.18	.....	4.04	4.5	3.70	3.27	3.30	3.88	3.49
31	3.24	.....	4.9	4.37	.....	3.99	.....	4.95	.....	3.30	3.82	.....

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, 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 latter part of 1914 caused a change in discharge relation.

EXTREMES OF STAGE.—Maximum stage recorded during year, 14.5 feet at 12 midnight, February 2; minimum stage recorded, 1.95 feet July 19.

No record of floods previous to establishment of station. Maximum stage since establishment of station, 19.4 feet at 6 p. m. March 27, 1913.

WINTER FLOW.—Discharge relation little if at all affected by ice.

The construction of a new bridge has changed the discharge relation at this station. Estimates of discharge are therefore withheld until a new rating curve is developed.

Discharge measurements of Greenbrier River at Alderson, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 1	J. G. Mathers	1.84	152
Feb. 6	W. Kessler	4.76	6,040

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.54	1.94	1.86	4.3	4.3	3.45	2.51	2.82	1.92	1.89	1.80	2.22
2	1.55	1.89	2.30	4.0	12.2	3.25	2.49	2.71	2.27	1.86	1.79	2.15
3	1.55	1.86	2.78	3.55	11.2	3.05	2.45	2.63	2.37	1.89	1.77	2.10
4	1.57	1.84	2.90	2.95	8.0	2.92	2.42	2.74	5.44	1.92	2.29	2.15
5	1.59	1.85	3.2	2.70	4.9	2.92	2.39	2.75	4.57	2.01	2.59	2.45
6	1.66	1.83	4.6	2.95	4.8	2.85	2.38	2.64	3.60	2.09	2.38	2.65
7	1.67	1.81	3.7	11.7	5.4	2.92	2.34	2.53	3.22	2.09	2.29	2.52
8	1.67	1.77	3.3	8.5	5.1	2.94	2.42	2.49	2.92	2.11	2.15	2.38
9	1.69	1.79	3.1	6.8	4.7	2.86	2.62	2.43	2.75	2.13	2.06	2.28
10	1.67	1.74	3.05	6.2	4.1	2.86	2.68	2.39	2.58	2.05	2.05	2.19
11	1.70	1.75	3.05	5.4	3.85	3.0	2.66	2.33	2.44	1.97	1.99	2.09
12	1.75	1.73	3.15	5.0	3.5	3.1	2.74	2.28	2.34	1.93	1.98	2.02
13	1.73	1.74	3.15	5.0	3.3	3.1	2.70	2.28	2.28	1.91	2.00	2.00
14	1.76	1.74	3.15	4.7	3.0	2.94	2.79	2.24	2.36	1.90	2.12	1.99
15	1.97	1.76	3.15	3.9	3.9	2.88	2.68	2.24	3.00	1.89	2.50	2.04
16	2.16	1.76	3.15	4.2	5.5	2.90	2.61	2.22	3.05	1.91	2.35	1.96
17	2.72	1.94	3.15	4.6	4.6	2.99	2.56	2.20	2.94	1.83	2.52	1.90
18	2.55	2.06	3.1	6.8	3.9	2.96	2.49	2.17	3.27	1.80	2.38	1.87
19	2.38	1.99	3.2	7.9	3.5	2.92	2.45	2.10	3.20	1.76	2.28	1.84
20	2.33	2.03	4.3	7.4	3.2	2.76	2.41	2.11	2.86	1.91	2.52	1.85
21	2.19	1.99	5.8	6.1	3.05	2.76	2.40	2.11	2.56	2.00	2.35	2.10
22	2.13	1.89	5.9	5.1	2.95	2.70	2.44	2.09	2.40	1.92	2.22	2.40
23	2.06	1.89	5.6	4.8	2.84	2.61	2.48	2.16	2.24	1.89	2.28	2.61
24	1.97	1.84	5.3	4.6	3.8	2.55	2.31	2.22	2.21	2.11	2.32	2.46
25	1.97	1.75	5.0	4.8	7.2	2.52	2.28	2.20	2.14	2.01	2.20	2.28
26	2.01	1.80	4.7	4.9	5.2	2.50	2.35	2.23	2.04	1.92	2.10	2.14
27	2.03	1.83	4.4	4.8	4.2	2.53	2.33	2.24	1.98	1.87	2.05	2.13
28	2.10	1.81	4.6	4.5	3.7	2.56	2.34	2.22	1.93	1.93	2.02	2.09
29	2.07	1.85	4.8	4.0	.....	2.55	2.44	2.21	1.90	1.90	2.04	2.04
30	2.04	1.90	4.9	3.7	.....	2.57	2.81	2.21	1.88	1.86	2.18	2.01
31	1.95	.....	4.9	3.6	.....	2.58	.....	1.97	.....	1.84	2.30	.....

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, 1915.

GAGE.—Chain gage attached to bridge; read once daily, to hundredths, by Harry Jones.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or from wooden bridge near depot. 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.—Probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 12.68 feet at 8.40 a. m. January 7; minimum stage, 4.10 feet at 6.30 p. m. September 30.

WINTER FLOW.—Ice may affect the discharge relation for short periods during December, January, and February.

Data inadequate for estimates of discharge.

The following discharge measurements were made by J. G. Mathers:

November 21, 1914: Gage height, 4.74 feet; discharge, 90 second-feet. Gage height, 4.72 feet; discharge, 88 second-feet.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.16	4.83	4.78	6.2	7.7	5.75	5.25	6.15	6.2	4.98	5.35	4.93
2	4.13	4.70	5.5	5.95	12.2	5.6	5.2	5.8	5.95	4.95	5.55	4.86
3	4.12	4.71	5.65	5.8	10.5	5.6	5.25	5.65	8.8	4.88	5.5	5.08
4	4.11	4.70	5.7	5.8	7.8	5.4	5.2	5.55	7.5	4.84	5.3	5.40
5	4.15	4.68	7.8	6.0	7.1	5.45	5.10	5.45	6.3	4.80	5.1	6.06
6	4.17	4.66	6.7	6.35	6.75	5.6	5.2	5.35	6.3	5.5	4.80	5.85
7	4.15	4.61	5.95	12.7	6.45	5.6	6.4	5.25	5.8	5.2	4.81	5.43
8	4.43	4.07	5.75	8.1	6.1	5.55	6.8	5.25	5.6	5.05	4.80	5.23
9	4.41	4.58	5.5	6.8	5.85	5.35	6.55	5.35	5.45	5.5	4.80	5.10
10	4.58	4.58	5.35	6.2	6.0	5.4	6.4	5.05	5.2	5.2	4.75	4.98
11	4.67	4.56	5.50	5.95	6.2	5.45	6.35	4.96	5.05	5.1	4.72	4.88
12	4.65	4.53	5.4	6.7	5.75	5.45	6.6	4.91	5.05	5.1	4.73	4.78
13	4.61	4.45	5.25	6.45	5.55	5.8	6.15	4.95	5.0	5.85	5.7	5.68
14	4.59	4.38	5.2	5.95	5.9	5.4	5.9	4.95	9.3	4.91	5.1	5.18
15	5.2	4.07	4.93	6.2	6.35	5.4	5.7	4.88	6.7	4.95	5.0	4.88
16	5.1	5.7	4.70	6.35	7.9	5.45	5.6	4.73	6.2	4.9	5.25	4.78
17	5.55	5.55	4.93	6.15	6.7	5.6	5.55	4.78	6.2	6.55	5.4	4.68
18	5.15	5.25	5.05	9.2	6.25	5.45	5.35	4.70	5.75	7.7	6.15	4.66
19	4.98	5.1	5.2	10.6	5.95	5.6	5.35	4.70	5.75	5.75	5.4	4.58
20	4.86	4.93	7.8	7.8	5.7	5.4	5.3	4.68	5.3	5.7	5.25	3.98
21	4.75	4.71	6.7	6.7	5.6	5.4	5.25	4.85	5.1	6.25	5.2	5.18
22	4.68	4.80	8.0	6.3	5.15	5.25	4.86	4.95	5.35	5.9	5.45	5.48
23	4.60	4.65	6.45	6.05	5.4	5.2	5.15	5.1	5.1	5.55	5.3	5.13
24	4.15	4.50	6.55	6.95	5.55	5.15	5.3	5.45	4.9	5.35	5.35	4.98
25	4.93	4.70	6.8	6.45	7.0	5.1	5.25	5.3	4.78	5.25	5.35	4.83
26	5.3	4.75	5.7	6.3	6.35	5.15	5.15	5.8	4.68	5.0	5.3	4.83
27	5.1	4.70	5.5	6.05	6.05	5.6	5.1	5.95	4.65	5.1	5.05	5.13
28	4.95	4.70	5.35	5.8	5.85	5.5	5.95	5.5	4.57	4.85	5.05	5.03
29	4.87	4.68	5.4	5.8	.....	5.45	7.1	5.4	4.46	4.75	5.65	4.93
30	4.88	4.53	7.4	5.65	.....	5.4	6.55	6.25	4.52	5.0	5.25	4.08
31	4.90	.....	6.8	5.5	.....	5.3	.....	7.4	.....	5.8	5.10	.....

NOTE.—No ice reported by observer.

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

LOCATION.—At highway bridge known as Brock's 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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, by Mrs. G. L. Ward.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 17.9 feet at 8 a. m., January 7; minimum stage, 3.60 feet at 7 a. m. October 3.

WINTER FLOW.—Discharge relation possibly affected by ice for short periods.

ACCURACY.—Gage-height record reliable.

Data inadequate for estimates of discharge.

The following discharge measurement was made by Mathers and Morgan:

November 1, 1914: Gage height, 5.06 feet; discharge, 376 second-feet.

Daily gage height, in feet, of Gauley River near Summersville, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.64	5.0	5.15	7.8	11.5	6.8	5.95	7.75	8.25	4.83	5.83	5.30
2	3.64	4.9	6.2	7.2	15.2	6.5	5.85	7.03	7.22	5.48	5.88	5.03
3	3.59	4.7	6.6	6.2	13.5	6.5	5.85	6.80	8.07	5.35	6.50	4.95
4	3.59	4.7	6.4	6.2	10.6	6.1	5.88	6.92	8.90	5.12	6.42	5.73
5	3.64	4.6	11.2	5.9	9.6	6.4	5.65	6.47	8.00	5.85	5.75	7.90
6	3.69	4.5	9.1	6.2	9.2	7.0	5.75	6.25	7.10	6.75	5.37	7.13
7	3.92	4.40	7.6	15.9	8.6	7.0	7.45	6.07	6.70	5.73	5.15	6.60
8	3.89	4.40	7.1	10.9	7.8	6.8	8.05	6.00	6.43	5.62	4.95	6.10
9	3.84	4.45	6.8	9.1	7.3	6.4	7.75	5.78	6.08	6.40	4.88	5.67
10	3.84	4.40	6.8	7.8	6.7	6.4	8.00	5.50	5.70	6.03	4.85	5.35
11	4.04	4.40	6.6	7.2	6.5	6.5	7.88	5.38	5.38	5.73	4.83	5.15
12	4.06	4.30	6.3	9.2	6.6	6.5	7.73	5.27	5.40	5.92	4.95	4.97
13	3.99	4.30	6.1	8.7	6.5	6.2	7.28	5.40	5.33	5.55	6.15	4.83
14	4.04	4.20	6.0	7.6	7.4	6.2	6.92	5.28	7.40	5.32	5.72	4.67
15	4.39	4.22	5.8	8.4	9.8	6.2	6.53	5.07	8.77	5.07	5.50	5.35
16	6.0	4.90	5.5	8.8	10.1	6.42	6.40	5.05	7.55	5.15	5.65	4.83
17	6.5	6.1	5.9	9.6	8.7	6.57	6.25	4.90	6.78	6.98	5.40	4.60
18	5.65	5.6	6.0	12.8	7.9	6.42	6.15	4.80	6.35	9.53	8.05	4.45
19	5.35	5.3	6.2	13.2	7.3	6.45	5.95	4.75	6.32	7.00	6.95	5.20
20	5.1	5.1	10.2	10.4	6.8	6.20	5.75	4.80	5.67	7.80	6.10	5.58
21	4.8	4.8	9.2	8.8	6.5	6.08	5.78	5.00	5.40	8.80	5.80	5.85
22	4.6	4.8	10.6	7.7	6.3	5.93	5.60	5.07	5.35	8.18	6.10	7.23
23	4.6	4.7	8.7	7.3	6.2	5.92	5.45	5.32	5.37	6.97	6.50	6.10
24	4.6	4.48	7.5	8.2	7.5	5.68	5.60	5.92	5.12	6.40	6.07	5.57
25	5.2	4.42	7.0	8.1	9.1	5.57	5.63	5.73	4.80	5.85	5.85	5.32
26	5.75	4.6	6.2	7.8	8.0	5.95	5.55	6.00	4.60	5.45	5.53	5.05
27	5.3	4.6	6.0	7.4	7.3	6.33	5.35	7.23	4.58	5.28	5.30	5.13
28	5.2	4.6	6.3	6.8	7.0	6.45	5.85	6.70	4.35	5.00	5.15	5.73
29	5.0	4.6	6.6	6.4	.....	6.48	9.40	6.30	4.28	4.88	5.95	5.57
30	4.9	4.48	9.9	6.1	.....	6.25	8.60	8.63	4.27	4.80	5.88	5.45
31	5.0	.....	9.2	6.7	.....	6.12	.....	9.35	.....	5.85	5.50	.....

NOTE.—Ice on river Dec. 15–18; slush ice jammed at gage Dec. 27 and 28.

GAULEY RIVER NEAR 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, 1915.

GAGE.—Vertical staff fastened to tree on right bank; read daily, morning and evening, to hundredths, 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, 7.85 feet at 7 a. m. February 16; minimum stage, 0.95 foot at 6 p. m. October 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.

WINTER FLOW.—Discharge relation may be affected by ice at intervals during December, January, and February.

ACCURACY.—Records of gage height accurate and reliable.

Data inadequate for estimates of discharge.

The following discharge measurements were made by wading, by Mathers and Morgan.

November 5, 1914: Gage height, 2.06 feet; discharge, 316 second-feet.

November 11, 1914: Gage height, 1.83 feet; discharge, 206 second-feet.

Daily gage height, in feet, of Gauley River near Belva, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.26	2.25	1.98	.....	.....	4.3	3.50	5.62	5.14	1.81	2.66	2.45
2	1.19	2.25	2.55	.....	.....	4.0	3.30	4.82	4.44	1.93	2.66	2.33
3	1.11	2.15	3.25	.....	.....	3.8	3.25	4.39	4.26	2.50	2.96	2.21
4	1.06	2.15	3.6	.....	.....	3.65	3.21	4.69	5.51	2.47	3.42	2.55
5	1.01	2.05	5.8	.....	.....	3.6	3.13	4.61	4.88	2.39	2.99	4.18
6	.99	2.0	6.9	.....	.....	4.3	3.02	4.28	4.21	3.08	2.66	4.41
7	.94	1.96	5.4	.....	.....	4.5	3.08	3.97	3.71	3.23	2.44	3.93
8	.91	1.89	4.3	.....	.....	4.4	4.46	3.73	3.46	2.85	2.26	3.35
9	.93	1.86	4.2	.....	4.9	4.3	4.38	3.51	3.28	2.77	2.20	3.02
10	1.17	1.82	4.0	.....	4.4	4.0	4.34	3.25	3.04	3.24	2.12	2.76
11	1.33	1.82	3.9	.....	4.1	4.0	4.36	3.05	2.78	2.96	2.09	2.58
12	1.25	1.83	3.7	.....	4.0	4.1	4.38	2.92	2.67	2.83	2.13	2.31
13	1.30	1.82	3.5	.....	3.9	3.95	4.19	2.85	2.56	2.89	2.08	2.21
14	1.51	1.76	3.3	.....	4.1	3.75	3.96	2.83	3.11	2.69	3.12	2.19
15	1.49	1.74	3.15	.....	5.3	3.7	3.70	2.73	5.86	2.43	2.59	2.09
16	1.54	1.74	3.15	.....	7.5	3.9	3.56	2.62	5.11	2.35	2.62	2.35
17	2.95	2.25	3.15	.....	6.2	4.2	3.43	2.55	4.34	2.45	2.74	2.10
18	3.1	2.85	3.15	.....	5.4	4.3	3.31	2.48	3.78	5.10	3.50	1.98
19	2.7	2.6	3.25	.....	4.8	4.2	3.22	2.36	3.64	4.20	4.16	1.96
20	2.45	2.5	.....	.....	4.3	4.0	3.06	2.30	3.17	4.35	3.38	2.34
21	2.4	2.35	.....	.....	3.95	3.8	2.98	2.37	2.84	5.05	2.94	2.64
22	2.15	2.2	.....	.....	3.7	3.6	2.92	2.46	2.64	5.10	2.75	3.42
23	2.05	2.05	.....	.....	3.55	3.45	2.86	2.58	2.57	4.29	2.95	3.42
24	2.05	2.15	.....	.....	3.55	3.35	2.84	2.77	2.50	3.52	3.16	2.94
25	2.05	2.0	.....	.....	6.3	3.25	3.06	2.99	2.36	3.10	2.85	2.62
26	2.4	1.96	.....	.....	5.4	3.15	3.18	3.13	2.15	2.79	2.69	2.40
27	2.7	2.0	.....	.....	4.9	3.6	3.06	4.11	2.07	2.61	2.53	2.33
28	2.55	2.0	.....	.....	4.5	3.75	3.56	4.07	1.97	2.44	2.39	2.62
29	2.35	2.0	.....	.....	.....	3.75	6.56	3.62	1.87	2.32	2.30	3.02
30	2.25	1.99	.....	.....	.....	3.7	6.58	4.56	1.80	2.22	2.81	2.82
31	2.2	.....	.....	.....	.....	3.6	.....	6.35	.....	2.12	2.63	.....

NOTE.—Gage carried away by ice Dec. 20, 1914; no gage readings Dec. 20 to Feb. 8.

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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to half-tenths, by Floyd Artrip.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Practically permanent. The removal of stones and boulders from the river bed in the vicinity of the point of control has at times affected the discharge relation. The first stones were removed in August, 1909, and more were removed during May, June, July, and August, 1911. Point of zero flow determined by leveling, August 16, 1910, gage height 1.3 feet ±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 5.8 feet at 7.30 a. m. February 2; minimum, 1.70 feet at 7.30 a. m. and 6 p. m. October 4.

WINTER FLOW.—Discharge relation affected by ice at times during December, January, and February.

ACCURACY.—See "Control."

Data inadequate for estimates of discharge.

The following discharge measurements were made by wading, by J. G. Mathers:

November 22, 1914: Gage height, 2.29 feet; discharge, 66 second-feet. Gage height, 2.27 feet; discharge, 64 second-feet.

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.69	2.32	2.95	2.92	4.2	2.68	2.50	2.85	2.58	2.00	2.13	2.27
2	1.69	2.30	3.0	2.78	5.5	2.68	2.50	2.72	2.53	2.38	2.33	2.17
3	1.69	2.28	3.0	2.70	4.4	2.52	2.50	2.85	2.63	2.13	2.96	2.22
4	1.64	2.20	2.88	2.60	3.55	2.45	2.45	2.78	2.86	2.10	2.53	2.42
5	1.74	2.20	4.8	2.52	3.3	2.45	2.48	2.72	2.70	2.78	2.30	2.97
6	2.04	2.18	3.45	3.5	3.3	2.50	2.78	2.60	2.56	2.56	2.18	2.79
7	1.94	2.15	3.1	5.5	3.05	2.48	3.25	2.58	2.46	2.28	2.13	2.57
8	1.86	2.10	2.95	3.75	2.88	2.40	3.20	2.50	2.48	2.40	2.08	2.47
9	1.92	2.15	2.85	3.4	2.72	2.40	3.20	2.45	2.38	2.60	2.06	2.37
10	1.95	2.10	2.80	2.98	2.68	2.38	3.10	2.38	2.33	2.36	2.00	2.27
11	1.93	2.10	2.65	2.85	2.62	2.50	3.0	2.30	2.28	2.28	2.38	2.22
12	1.85	2.10	2.60	3.2	2.60	2.40	2.98	2.32	2.18	2.23	2.50	2.17
13	1.88	2.05	2.55	2.90	2.68	2.45	2.85	2.38	2.10	2.16	2.28	2.12
14	2.23	2.05	2.52	2.78	3.35	2.35	2.75	2.28	2.76	2.10	2.18	2.15
15	2.28	2.30	2.78	3.0	4.7	2.52	2.60	2.20	2.60	2.03	2.43	2.05
16	3.05	2.82	2.50	2.98	3.8	2.60	2.50	2.20	2.46	2.03	2.28	1.97
17	2.61	2.70	2.55	3.7	3.3	2.62	2.48	2.15	2.36	2.58	2.60	1.89
18	2.48	2.50	2.52	5.0	3.0	2.38	2.45	2.10	2.48	2.76	3.50	1.99
19	2.31	2.45	2.50	4.8	2.85	2.45	2.40	2.10	2.36	2.40	2.80	2.42
20	2.23	2.40	3.2	3.6	2.70	2.45	2.38	2.12	2.20	3.16	2.56	2.27
21	2.15	2.38	3.35	3.2	2.62	2.38	2.35	2.22	2.13	3.26	2.63	2.92
22	2.16	2.30	3.4	2.9	2.60	2.32	2.30	2.12	2.08	2.90	2.76	2.75
23	2.15	2.20	3.0	2.85	2.60	2.30	2.32	2.12	2.03	2.63	2.68	2.42
24	2.25	2.10	2.85	2.92	4.1	2.30	2.32	2.15	1.98	2.56	2.53	2.35
25	2.70	2.20	2.72	2.82	3.5	2.30	2.30	2.12	1.93	2.33	2.46	2.25
26	2.48	2.15	2.60	2.75	3.1	2.62	2.28	2.25	1.88	2.23	2.33	2.17
27	2.38	2.15	2.68	2.65	2.9	2.50	2.22	2.45	1.88	2.16	2.26	2.29
28	2.30	2.12	2.70	2.52	2.85	2.55	3.2	2.28	1.83	2.08	2.46	2.55
29	2.28	2.10	2.70	2.40	.....	2.58	3.6	2.25	1.78	2.03	2.66	2.39
30	2.30	2.40	3.6	2.42	.....	2.60	3.1	2.80	1.80	2.03	2.43	2.29
31	2.40	.....	3.15	2.42	.....	2.55	.....	2.75	.....	2.08	2.36	.....

NOTE.—River partly frozen over Dec. 15-17.

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

LOCATION.—At Bays Ferry, 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, 1915.

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

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

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 13.25 feet at 7.40 a. m., February 3; minimum stage, 2.63 feet October 4.

WINTER FLOW.—Discharge relation at times affected by ice gorges.

ACCURACY.—Gage-height records very reliable. In the fall, backwater is sometimes caused at the gage by leaves lodging at the riffle below.

Data inadequate for determining daily discharges.

The following discharge measurements were made by Mathers and Morgan:

October 30, 1914: Gage height, 3.39 feet; discharge, 49 second-feet. Gage height, 3.36 feet; discharge, 45 second-feet.

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.60	3.28	3.47	6.6	7.5	5.6	.....	7.35	4.61	3.05	3.02	3.11
2	2.58	3.28	4.20	6.2	12.2	5.4	4.36	6.69	4.80	3.27	3.06	3.07
3	2.56	3.24	5.1	5.8	12.9	5.1	4.32	6.31	4.86	3.46	3.14	3.04
4	2.55	3.22	5.7	5.35	10.1	4.9	4.32	6.12	4.78	3.61	.....	3.11
5	2.58	3.20	7.8	5.0	8.2	4.85	4.30	6.44	4.60	3.55	.....	4.86
6	2.65	3.18	8.4	4.95	7.6	4.8	4.29	6.22	4.40	3.49	.....	4.86
7	2.64	3.16	7.7	12.8	7.3	4.95	4.28	6.00	4.27	3.43	.....	4.70
8	2.62	3.14	6.5	11.8	7.0	5.05	4.38	5.55	4.45	3.46	.....	4.33
9	2.61	3.12	6.0	8.6	6.6	4.95	4.40	5.22	4.32	4.30	.....	3.98
10	2.64	3.10	6.0	7.2	6.2	4.9	4.40	5.06	4.08	4.19	.....	3.77
11	2.72	3.08	6.0	6.7	6.0	5.3	4.42	4.96	3.90	4.04	.....	3.42
12	2.72	3.06	5.9	6.5	5.6	5.4	4.66	4.86	3.86	3.89	.....	3.31
13	2.74	3.04	.....	6.3	5.3	5.3	4.77	4.77	3.88	3.68	.....	3.24
14	2.82	3.04	5.7	5.8	5.1	5.2	4.73	4.68	3.84	3.53	.....	3.18
15	3.04	3.08	5.6	6.2	7.0	5.2	4.64	4.56	5.46	3.40	3.33	3.10
16	3.34	3.12	5.1	6.2	8.0	5.3	4.59	4.45	5.34	3.53	3.25	3.08
17	4.02	3.51	4.65	8.2	7.4	5.4	4.54	4.38	5.06	3.47	3.11	3.06
18	4.15	3.80	4.35	10.2	7.0	5.35	4.51	4.29	4.80	3.51	3.39	3.05
19	4.06	3.74	4.35	11.8	6.5	5.3	4.48	4.18	4.50	3.46	3.37	3.04
20	3.80	3.62	5.45	10.8	6.0	5.3	4.44	4.12	4.24	3.55	3.33	3.08
21	3.60	3.55	6.4	8.1	5.5	5.35	4.37	4.03	4.05	3.93	3.27	3.31
22	3.50	3.48	7.1	6.9	5.05	5.1	4.30	3.91	3.84	3.84	3.20	3.66
23	3.42	3.43	6.7	6.5	4.85	4.9	4.24	3.84	3.66	3.57	3.13	3.80
24	3.36	3.40	6.2	6.0	4.9	4.75	4.80	3.82	3.58	3.45	3.07	3.58
25	3.32	3.39	5.9	6.0	5.8	4.6	5.21	3.78	3.48	3.37	3.07	3.44
26	3.32	3.38	5.6	5.8	6.6	4.55	5.16	3.78	3.40	3.34	3.03	3.40
27	3.48	3.36	5.35	5.6	6.2	4.6	5.08	3.82	3.32	3.30	2.99	3.60
28	3.59	3.35	5.15	5.5	5.7	4.6	6.12	3.78	3.25	3.25	2.98	3.87
29	3.45	3.32	5.1	5.6	.....	4.48	8.48	3.74	3.17	3.19	2.98	3.90
30	3.37	3.32	7.0	5.8	.....	4.42	7.98	4.22	3.10	3.13	2.99	3.78
31	3.30	.....	7.3	.....	.....	4.37	.....	4.34	.....	3.07	3.15	.....

NOTE.—River partly frozen over Dec. 14 and 15; complete ice cover Dec. 16–18. Gage read to top of ice Dec. 26. Gage was stolen Aug. 4 and replaced Aug. 15; record missing.

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, 1915.

GAGE.—Vertical staff attached to right abutment of bridge; read daily, morning and evening, to hundredths, by Cherry Woodzell.

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

CHANNEL AND CONTROL.—Practically permanent. Point of zero flow determined by levels run August 13, 1910, gage height 0.95 foot ±0.2 feet.

EXTREMES OF STAGE.—Maximum stage recorded during year, 6.5 feet at 8 a. m., February 2; minimum stage, 1.39 feet October 3 and 4.

WINTER FLOW.—Discharge relation sometimes affected by ice.

Data inadequate for estimates of discharge.

The following discharge measurements were made by Mathers and Morgan:

November 19, 1914: Gage height, 2.05 feet; discharge, 63 second-feet. Gage height, 2.05 feet; discharge, 64 second-feet.

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.42	1.99	1.78	3.25	4.35	2.78	2.58	3.0	3.35	1.95	2.20	2.18
2	1.41	1.94	2.70	3.1	6.2	2.72	2.56	2.75	3.15	2.08	2.05	2.06
3	1.39	1.90	2.82	2.82	5.4	2.62	2.52	2.64	4.20	2.03	2.00	2.00
4	1.40	1.88	2.75	2.60	4.3	2.52	2.52	2.58	4.15	1.98	2.15	2.12
5	1.40	1.81	3.35	2.50	3.8	2.55	2.51	2.49	3.65	2.18	2.04	2.35
6	1.40	1.76	3.40	2.48	3.6	2.72	2.60	2.42	3.20	2.45	1.92	2.48
7	1.40	1.74	2.95	6.6	3.45	2.72	3.5	2.40	2.95	2.28	1.82	2.48
8	1.42	1.70	2.81	4.4	3.2	2.58	3.4	2.33	2.80	2.20	1.80	2.35
9	1.50	1.70	2.77	3.65	2.98	2.50	3.3	2.30	2.68	2.30	1.82	2.15
10	1.50	1.70	2.70	3.25	2.86	2.58	3.25	2.22	2.46	2.20	1.90	2.04
11	1.60	1.70	2.64	3.05	2.76	2.62	3.2	2.12	2.34	2.08	1.81	2.00
12	1.62	1.68	2.54	3.2	2.70	2.64	3.2	2.10	2.28	2.02	1.82	1.96
13	1.58	1.64	2.43	3.05	2.82	2.58	3.1	2.09	2.22	2.06	3.15	1.92
14	1.60	1.62	2.34	2.92	3.25	2.58	2.95	2.04	4.8	2.02	2.70	1.92
15	1.65	1.62	2.30	3.1	4.15	2.68	2.82	1.99	3.75	1.92	3.15	2.00
16	2.05	1.66	2.30	3.2	4.0	2.82	2.72	1.98	3.2	1.88	2.90	1.92
17	2.50	2.48	2.30	3.95	3.5	2.88	2.62	1.98	3.05	1.99	2.72	1.82
18	2.25	2.38	2.26	5.6	3.2	2.78	2.54	1.96	3.55	3.20	2.65	1.88
19	2.06	2.04	2.32	5.4	2.95	2.64	2.46	1.95	2.95	2.72	2.55	3.10
20	1.96	2.00	3.8	4.3	2.79	2.58	2.48	1.98	2.70	2.60	2.36	2.70
21	1.86	2.00	3.65	3.6	2.69	2.52	2.48	2.25	2.48	3.60	2.25	2.90
22	1.78	1.94	4.05	3.2	2.62	2.46	2.39	2.45	2.41	3.00	2.42	2.40
23	1.72	1.90	3.4	3.0	2.59	2.41	2.32	2.70	2.34	2.70	2.62	2.56
24	1.77	1.85	3.05	3.2	3.0	2.38	2.30	2.65	2.19	2.48	2.48	2.32
25	2.05	1.81	2.85	3.25	3.6	2.38	2.28	2.52	2.11	2.35	2.42	2.14
26	2.28	1.74	2.75	3.1	3.3	2.75	2.24	2.52	2.02	2.22	2.30	2.02
27	2.18	1.70	2.80	2.98	3.0	2.88	2.21	2.80	1.98	2.11	2.12	2.01
28	2.05	1.70	2.78	2.85	2.94	2.78	2.62	2.65	1.93	2.02	2.08	2.02
29	1.92	1.70	2.85	2.72	.....	2.76	3.7	2.52	1.84	1.94	2.30	2.00
30	1.90	1.74	4.3	2.70	.....	2.70	3.3	3.5	1.80	1.96	2.40	1.98
31	1.98	.....	3.75	2.80	.....	2.62	.....	3.85	.....	2.25	2.32	.....

NOTE.—Ice in river Dec. 15–18; ice going out Dec. 19. River frozen over Dec. 27 and 28. Ice gone out Dec. 29.

ELK RIVER AT GASSAWAY, W. VA.

LOCATION.—At the highway bridge immediately 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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths 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. Point of zero flow, determined by leveling, August 12, 1910, and September 13, 1912. Gage height, 0.5 foot ± 0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 16.86 feet at 7.15 a. m. February 3; minimum, 1.63 feet at 5 p. m. November 30.

No records of floods prior to the installation of the gage are available. The flood of January 30, 1911, reached a stage of 30.4 feet, as determined by levels from flood marks on September 13, 1912.

WINTER FLOW.—Ice may affect the discharge relation for short periods.

Data inadequate for estimates of discharge.

The following discharge measurement was made by Mathers and Morgan:

November 17, 1914: Gage height, 1.65 feet; discharge, 60 second-feet.

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.68	5.5	7.9	3.5	3.5	4.3	7.0	1.9	2.17	2.35
2	.....	1.82	4.9	14.8	3.5	3.5	4.0	4.9	1.93	2.14	2.28
3	.....	1.86	4.2	15.9	3.45	3.4	3.9	6.8	1.97	2.27	2.22
4	.....	2.02	3.45	11.0	3.2	3.2	3.45	9.2	1.93	2.04	2.27
5	.....	5.6	2.78	7.2	3.1	2.8	2.99	6.5	1.9	1.98	2.42
6	.....	6.0	7.9	5.9	3.25	2.78	2.96	5.8	1.87	1.96	2.78
7	.....	5.9	15.2	5.2	3.35	2.75	2.91	5.4	1.84	1.9	2.67
8	.....	5.8	11.0	5.0	3.7	2.74	2.7	5.6	1.83	1.87	2.56
9	.....	5.6	7.0	4.9	3.7	2.7	2.49	5.1	2.24	1.86	2.50
10	.....	5.2	5.6	4.8	3.6	2.66	2.32	3.5	2.22	1.8	2.40
11	.....	4.9	6.4	4.8	3.6	2.94	2.29	2.64	2.2	1.82	2.28
12	.....	4.1	11.8	4.8	3.5	4.1	2.22	2.59	2.18	1.8	2.16
13	.....	3.9	9.5	4.7	3.5	4.3	2.14	2.44	2.14	1.84	2.02
14	.....	3.9	6.4	4.7	3.4	4.0	2.1	3.17	2.1	2.36	1.78
15	.....	3.8	5.6	4.6	3.3	3.7	2.06	5.5	2.09	2.44	1.76
16	.....	3.7	5.2	5.0	3.3	3.6	2.04	4.6	2.05	2.49	1.74
17	.....	4.0	5.5	5.0	3.25	3.45	2.0	4.4	1.88	2.79	2.04
18	2.18	5.7	12.5	4.9	3.35	3.2	1.98	4.1	2.54	2.7	2.24
19	2.14	9.3	16.0	4.8	3.5	2.9	1.96	3.6	3.35	2.49	2.36
20	2.08	12.8	10.9	4.8	3.5	2.62	2.0	3.0	2.72	2.42	2.66
21	2.04	16.4	7.2	4.7	3.4	2.58	2.1	2.79	2.62	2.39	3.38
22	1.96	13.3	6.1	4.7	3.25	2.56	2.3	2.66	3.7	2.3	3.60
23	1.85	9.0	5.5	4.6	3.05	2.52	2.5	2.59	3.35	2.24	3.39
24	1.78	7.4	5.1	4.6	2.94	2.47	2.68	2.54	2.66	2.66	2.97
25	1.7	6.4	5.8	4.5	2.87	2.44	2.79	2.42	2.54	2.5	2.49
26	1.68	5.5	5.6	4.4	2.84	2.42	2.98	2.25	2.22	2.35	2.45
27	1.67	4.7	5.1	4.1	2.82	2.4	3.6	2.12	2.08	2.27	2.38
28	1.66	4.1	4.8	3.8	2.8	2.6	3.6	1.94	2.0	2.22	2.26
29	1.65	5.6	4.4	.....	2.92	4.9	4.0	1.92	1.98	2.3	2.10
30	1.64	7.0	4.0	.....	3.6	4.6	5.7	1.9	2.02	2.44	2.02
31	.....	6.4	4.9	.....	3.5	.....	9.2	.....	2.09	2.46	.....

NOTE.—No ice reported by observer.

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, 1915.

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

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

CHANNEL AND CONTROL.—Probably permanent. Point of zero flow, determined by levels run August 11, 1910, and September 14, 1912; gage height, 1 foot ± 0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 20.25 feet at 8 a. m. February 3; minimum stage, 1.85 feet at 5.05 p. m. October 7.

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

WINTER FLOW.—Discharge relation affected by ice at times during December, January, and February.

ACCURACY.—Gage heights at times affected by backwater from Big Sandy Creek, which joins Elk River immediately below the gage. This backwater may be negligible at low stages in the Big Sandy, but at other times it may form a large part of the flow in Elk River above the junction of the two streams. On November 28, 1913, engineers of the Survey found the flow of the creek to be 29 per cent of the flow in Elk River above Big Sandy. The discharge and drainage area of Big Sandy Creek should therefore be included in estimating discharge at this

station; that is, the Clendenin gage should be considered an index of the flow of Elk River just below the mouth of Big Sandy Creek. Discharge measurements at this station published prior to 1913 do not include the flow of the Big Sandy.

Data inadequate for estimates of discharge.

The following discharge measurement was made by Mathers and Morgan:

November 16, 1914: Gage height, 2.2 feet; discharge, 96 second-feet.

Daily gage height, in feet, of Elk River at Clendenin, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.84	2.5	2.42	6.4	12.7	4.2	4.0	5.3	6.9	2.44	4.0	2.48
2	1.85	2.42	2.92	5.4	13.4	4.1	3.85	4.7	5.8	3.9	3.35	2.64
3	1.79	2.37	2.95	4.7	20.2	4.0	3.7	4.3	12.8	4.1	3.85	2.68
4	1.8	2.36	3.2	4.3	13.6	3.85	3.5	4.1	10.1	3.45	3.95	2.9
5	1.79	2.37	7.2	3.9	9.4	4.0	3.45	3.85	7.7	3.1	3.35	5.6
6	1.77	2.32	5.8	3.8	8.3	5.0	3.4	3.65	6.1	2.96	2.93	4.3
7	1.77	2.26	5.0	7.6	7.3	5.2	3.25	3.5	5.0	2.8	2.72	4.1
8	1.77	2.22	4.3	11.7	6.3	5.2	3.4	3.4	4.9	2.88	2.6	3.7
9	1.79	2.18	4.4	7.5	5.6	5.0	4.3	3.15	4.4	3.5	2.54	3.5
10	1.79	2.16	4.3	5.9	4.9	4.8	4.1	3.0	3.95	3.2	2.48	3.1
11	1.79	2.12	4.2	5.0	4.6	4.6	4.2	2.9	3.55	3.0	2.51	2.92
12	1.81	2.1	4.1	15.3	4.4	4.6	4.8	2.85	3.95	3.0	2.43	2.72
13	1.81	2.14	3.95	11.8	4.4	4.5	4.7	2.86	3.9	2.93	2.36	2.62
14	1.87	2.16	3.8	7.6	4.3	4.2	4.5	2.75	3.6	2.78	2.36	2.52
15	1.88	2.16	3.5	7.4	4.6	4.1	4.4	2.68	6.8	2.64	2.38	2.44
16	2.0	2.18	3.45	8.5	5.8	4.1	4.2	2.68	7.0	2.57	2.94	2.38
17	2.12	2.16	3.75	7.2	6.4	4.2	4.0	2.61	5.8	2.52	3.0	2.34
18	2.72	2.14	3.55	9.8	5.6	4.2	3.9	2.52	5.1	2.55	2.49	2.32
19	2.62	2.12	4.2	13.6	5.0	4.2	3.6	2.47	4.6	2.64	3.05	2.82
20	2.54	2.16	9.1	11.1	4.6	4.2	3.5	2.44	4.3	3.15	3.2	3.2
21	2.61	2.58	11.8	7.5	4.2	4.2	3.5	2.5	3.8	3.35	2.98	4.2
22	2.54	2.49	10.5	5.9	4.0	4.0	3.4	2.62	3.45	2.87	2.84	4.0
23	2.43	2.41	7.6	5.3	3.85	3.95	3.35	3.15	3.25	3.9	2.72	3.9
24	2.4	2.38	5.6	5.4	3.65	3.85	3.25	3.85	3.2	3.5	2.59	3.7
25	2.45	2.32	4.9	6.6	3.7	3.8	3.2	4.2	2.99	3.15	2.6	3.35
26	2.56	2.28	4.4	7.2	4.8	3.7	3.2	4.2	2.66	2.9	2.9	3.1
27	2.52	2.24	3.65	6.3	4.6	3.7	3.2	4.8	2.66	2.72	2.76	3.1
28	2.38	2.18	3.5	5.7	4.4	4.2	3.15	4.6	2.54	2.67	2.68	3.2
29	2.45	2.15	4.4	5.1	.....	4.2	3.7	4.5	2.45	2.58	2.6	2.98
30	2.68	2.19	8.4	4.6	.....	4.1	5.6	5.1	2.37	2.53	2.62	2.8
31	2.54	.....	7.8	5.4	.....	4.0	.....	7.1	.....	2.58	2.5	.....

NOTE.—No ice reported by observer.

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 September 30, 1915.

GAGE.—Standard chain gage attached to bridge; read daily, morning and evening, to hundredths 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 AND CONTROL.—Practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.8 feet at 8 a. m. January 12; minimum stage, 0.99 foot at 7 a. m. and 6 p. m. October 8.

WINTER FLOW.—Discharge relation little if at all affected by ice.

ACCURACY.—Gage-height record reliable.

Data inadequate for determining daily discharge.

Discharge measurements of Coal River at Brushton, W. Va., during the year ending Sept. 30, 1915.

[Made by Mathers and Morgan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 14	1.25	22.0
14	1.25	20.3

Daily gage height, in feet, of Coal River at Brushton, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.09	1.43	1.33	3.9	7.0	2.41	2.44	3.1	3.0	1.32	1.72	1.22
2	1.04	1.38	1.68	3.3	7.2	2.34	2.27	2.8	2.8	1.46	1.70	1.22
3	1.02	1.39	1.73	2.9	8.3	2.31	2.22	4.0	4.2	1.62	2.0	1.32
4	1.08	1.39	2.7	2.65	5.5	2.25	2.23	5.4	3.55	1.58	2.45	1.54
5	1.04	1.35	4.9	2.49	4.6	2.55	2.17	4.6	3.0	1.68	1.92	3.4
6	1.04	1.30	3.6	2.46	4.5	3.85	2.11	3.8	2.6	1.76	1.68	2.55
7	1.00	1.28	2.95	7.0	4.3	4.0	2.09	4.3	2.36	1.80	1.59	2.45
8	.99	1.27	2.6	5.2	3.75	3.7	2.04	3.0	2.34	2.05	1.48	2.2
9	1.18	1.28	2.40	3.9	3.4	3.35	2.00	2.75	2.5	2.2	1.46	1.98
10	1.16	1.28	2.30	3.25	3.05	3.25	2.48	2.48	2.25	2.0	1.44	1.84
11	1.10	1.24	2.26	2.95	2.9	3.3	1.99	2.30	2.1	1.88	1.38	1.70
12	1.10	1.23	2.25	9.1	2.75	3.2	2.13	2.22	2.35	1.80	1.60	1.62
13	1.06	1.20	2.25	5.9	2.42	3.0	2.08	2.07	2.2	1.82	2.1	1.60
14	1.08	1.21	2.26	4.5	2.55	2.8	2.02	2.11	2.1	1.84	1.88	1.56
15	1.16	1.21	2.12	5.7	2.6	2.7	2.00	2.02	2.1	1.74	1.72	1.66
16	1.32	1.25	1.89	5.6	2.65	2.95	2.00	1.93	2.3	1.96	2.1	1.73
17	1.85	1.23	1.88	5.0	2.8	4.1	1.90	1.83	2.2	2.25	1.94	1.59
18	2.38	1.22	1.90	6.7	2.75	3.8	2.00	1.79	2.1	2.05	1.79	1.52
19	2.24	1.22	2.35	7.0	2.65	3.7	1.94	1.74	1.98	1.84	1.63	1.46
20	2.02	1.31	5.7	5.0	2.5	3.25	1.93	1.72	1.86	1.98	1.55	1.43
21	1.84	1.30	5.3	3.7	2.44	3.05	1.91	1.66	1.74	4.4	1.52	1.50
22	1.72	1.33	5.2	3.35	2.39	2.95	1.90	1.73	1.43	3.55	1.46	1.60
23	1.62	1.30	4.0	3.15	2.32	2.85	2.26	1.86	1.60	2.7	1.40	1.71
24	1.62	1.26	3.25	3.55	2.34	2.8	3.3	1.86	1.54	2.3	1.36	1.70
25	1.59	1.24	2.9	4.5	2.38	2.65	3.4	1.82	1.46	2.05	1.36	1.59
26	1.58	1.23	2.7	4.6	2.42	2.65	3.05	1.79	1.37	1.89	1.27	1.48
27	1.60	1.23	2.31	3.95	2.45	2.7	2.8	2.16	1.34	1.53	1.26	1.50
28	1.54	1.26	2.46	3.55	2.40	2.7	2.75	2.18	1.30	1.66	1.30	1.55
29	1.54	1.23	2.85	3.2	.....	2.75	3.35	2.16	1.29	1.59	1.26	1.58
30	1.51	1.24	6.8	2.95	.....	2.65	3.45	2.7	1.29	1.53	1.24	1.56
31	1.49	.....	5.2	3.95	.....	2.55	.....	3.3	.....	1.63	1.24	.....

NOTE.—Discharge relation probably not materially affected by ice.

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, 1915.

GAGE.—Staff gage in two sections on right bank; read daily, morning and evening, to hundredths, by W. C. Hoy.

DISCHARGE MEASUREMENTS.—Made from boat 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Probably permanent. Point of zero flow determined by levels run September 16, 1912, gage height 0.0 ±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 16.74 feet at 5 p. m. February 3; minimum stage, 0.61 foot at 5 p. m. September 2.

WINTER FLOW.—Discharge relation probably affected by ice for short periods.

ACCURACY.—Gage-height record reliable.

Data inadequate for estimates of discharge.

The following discharge measurements were made by wading, by Mathers and Morgan.

November 13, 1914: Gage height, 0.92 feet; discharge, 44.6 second-feet. Gage height, 0.92 feet; discharge, 45.1 second-feet.

Daily gage height, in feet, of Coal River at Fuqua, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.76	1.20	0.96	6.50	13.54	2.50	2.78	3.86	3.32	0.89	1.51	0.67
2	.72	1.16	1.36	4.50	14.50	2.48	2.60	3.26	3.14	1.02	1.32	.62
3	.71	1.11	1.98	3.74	16.62	2.42	2.50	4.54	5.34	1.28	1.30	.74
4	.71	1.07	2.82	3.35	11.63	2.32	2.40	8.88	5.34	1.24	2.94	1.36
5	.71	1.03	7.19	3.02	8.18	2.91	2.28	7.70	3.88	1.34	2.22	2.56
6	.70	1.00	5.52	2.91	7.45	4.78	2.17	5.54	3.12	1.52	1.64	2.63
7	.70	.97	3.88	6.72	7.18	5.69	2.08	4.36	2.53	1.50	1.36	2.04
8	.74	.94	3.14	8.68	5.96	5.10	1.98	3.78	2.38	1.62	1.19	1.84
9	.83	.96	2.78	5.57	5.17	4.44	1.92	3.24	2.51	2.60	1.05	1.55
10	.92	.97	2.59	4.30	4.12	4.08	1.88	2.80	2.12	2.19	1.04	1.34
11	.84	.96	2.54	3.68	3.78	4.14	1.92	2.46	1.86	1.83	1.00	1.16
12	.78	.96	2.52	13.30	3.54	3.95	2.18	2.26	2.55	1.56	1.02	1.05
13	.76	.92	2.52	12.16	3.29	3.58	2.24	2.22	2.37	1.70	1.26	.98
14	.73	.90	2.56	7.91	3.13	3.34	2.12	2.06	2.02	1.52	1.41	.92
15	.75	.90	3.21	8.98	3.10	3.14	2.11	1.87	1.86	1.41	1.21	.86
16	.93	.90	2.42	9.62	3.10	3.31	1.98	1.75	2.66	1.32	1.17	.98
17	1.31	.91	2.41	7.80	3.10	5.64	1.98	1.65	2.54	1.92	1.94	.91
18	2.10	.91	2.36	10.64	3.11	5.80	1.92	1.52	2.12	1.60	1.54	.89
19	2.22	.90	3.86	13.70	3.02	4.96	1.86	1.45	1.91	1.46	1.20	.83
20	2.03	.96	9.58	9.22	2.87	4.42	1.81	1.42	1.68	1.48	1.04	.74
21	1.74	.97	9.86	6.47	2.72	4.05	1.80	1.40	1.53	5.74	.98	.92
22	1.54	.97	9.19	4.78	2.62	3.78	1.76	1.43	1.38	4.78	.92	.88
23	1.40	.96	5.98	3.80	2.54	3.62	2.65	1.62	1.28	3.12	.87	.98
24	1.35	.93	4.32	4.32	2.51	3.38	6.08	1.55	1.16	2.35	.82	1.10
25	1.34	.94	3.86	6.37	2.58	3.21	5.32	1.56	1.08	1.88	.77	.96
26	1.35	.95	3.38	7.50	2.64	3.14	4.36	1.52	1.01	1.62	.72	.86
27	1.32	.91	5.22	6.30	2.62	3.19	3.69	2.12	.94	1.40	.69	.90
28	1.30	.92	4.89	5.18	2.54	3.24	3.41	2.26	.88	1.26	.69	.93
29	1.30	.92	5.58	4.32	.....	3.29	3.64	2.02	.86	1.16	.69	.92
30	1.30	.94	11.09	3.91	.....	3.12	4.79	2.34	.80	1.08	.78	.86
31	1.24	.....	9.68	5.84	.....	2.96	.....	3.88	.....	1.08	.72	.....

NOTE.—Ice on river Dec. 15–17. Ice gorged above and below gage Dec. 27; ice out Dec. 29.

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 to September 30, 1915.

GAGE.—Vertical and inclined staff on left bank just below McCorkle Hotel; read twice daily, to hundredths, 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, steep, wooded, and do not overflow. Bed of stream composed of loose sand, but control is probably fairly permanent. Point of zero flow, gage height 0.5±0.5 foot. Flow of Cobb Creek affects stage at gage and should be included in station.

EXTREMES OF STAGE.—Maximum stage recorded, 3.65 feet at 6 a. m. and 7 p. m. August 4; minimum, 1.70 feet at 7 a. m. and 7 p. m. September 2; 7 p. m. September 20. Highest known flood reached a stage represented by gage height 22.5 feet.

WINTER FLOW.—No information available.
DIVERSIONS.—None.
REGULATION.—None.
ACCURACY.—Records good.
COOPERATION.—Station maintained in cooperation with United States Engineer Corps.

Data inadequate for determining daily discharge.

Discharge measurements of Little Coal River at McCorkle, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 21	Ellsworth and Conklin	6.33	2,170
24	do	2.93	209
24	C. E. Ellsworth	2.91	199

Daily gage height, in feet, of Little Coal River at McCorkle, W. Va., for the year ending Sept. 30, 1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		2.54	1.76	11		2.31	2.20	21		2.02	2.00
2		2.56	1.70	12		2.28	2.11	22		2.00	2.11
3		2.84	1.90	13		2.36	2.00	23	3.1	1.93	2.30
4		3.65	2.46	14		2.32	1.94	24	2.88	1.86	2.14
5		3.02	2.85	15		2.22	1.86	25	2.71	1.81	1.98
6		2.68	2.84	16		2.18	1.79	26	2.58	1.78	1.86
7		2.58	2.70	17		2.40	1.74	27	2.52	1.75	1.92
8		2.45	2.52	18		2.44	1.84	28	2.38	1.81	2.35
9		2.38	2.41	19		2.09	1.80	29	2.30	1.80	1.94
10		2.32	2.30	20		2.08	1.70	30	2.26	2.00	1.94
								31	2.45	1.83	

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, 1915.
GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths, 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. Point of zero flow, determined by leveling, August 10, 1910; gage height, 1.2 feet ±0.2 foot; November 25, 1913, this stage was found to be 0.7±0.2 foot.
EXTREMES OF STAGE.—Maximum stage recorded during year, 15 feet at 7.30 a. m. February 3; minimum stage, 1.4 feet at 6.30 p. m. July 2.

The flood of June 27, 1910, reached a stage represented by 33 feet referred to gage datum. Some of the flood water passed around the gage.

WINTER FLOW.—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.

Data inadequate for determining daily discharge.

Discharge measurements of Pocatalico River at Sissonville, W. Va., during the year ending Sept. 30, 1915.

[Made by Mathers and Morgan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 7	2.15	5.58
7	2.15	5.72

Daily gage height, in feet, of Pocatalico River at Sissonville, W. Va., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.64	2.20	2.22	3.6	13.4	2.7	2.28	2.19	3.05	1.88	1.90	1.79
2	1.46	2.25	2.30	2.8	13.9	2.6	2.35	2.20	2.65	1.63	1.96	1.83
3	1.46	2.16	2.48	2.9	13.9	2.6	2.35	2.20	3.6	1.69	4.38	1.82
4	1.44	2.15	4.0	2.8	7.4	2.45	2.38	2.19	3.4	1.90	4.83	1.93
5	1.36	2.10	8.8	2.7	7.0	3.6	2.10	2.08	2.8	2.05	3.13	3.33
6	1.36	2.13	5.0	3.25	7.8	5.8	2.22	1.94	2.6	2.08	2.48	3.53
7	1.36	2.15	3.8	9.7	5.2	4.2	2.12	2.30	2.35	2.09	2.43	2.98
8	1.35	2.14	3.25	5.0	4.2	3.8	2.15	1.82	2.42	2.6	2.20	2.28
9	1.58	2.18	3.3	3.7	3.7	3.5	2.25	1.95	2.15	2.6	2.16	2.38
10	1.64	2.08	3.7	3.2	3.3	3.3	2.10	1.98	2.5	2.6	2.06	2.38
11	1.62	1.95	3.8	3.0	3.2	3.15	2.20	1.94	2.2	2.42	2.00	2.10
12	1.64	2.10	3.35	10.6	3.2	3.0	2.25	1.92	3.2	2.20	2.06	2.16
13	1.80	2.04	3.05	7.2	3.1	2.8	2.15	1.95	3.4	2.12	2.06	2.00
14	1.96	2.04	3.1	5.0	3.0	2.7	2.24	1.78	2.5	2.12	1.98	1.96
15	2.04	2.08	2.9	5.0	3.15	2.6	2.17	1.92	4.3	2.08	2.23	2.03
16	2.30	2.05	2.7	4.0	3.2	2.7	2.25	1.95	4.2	1.98	2.04	1.94
17	2.85	2.10	2.48	3.7	2.9	2.7	2.18	1.98	3.3	1.98	2.20	1.88
18	2.70	2.12	2.40	7.2	2.8	2.6	2.22	1.88	2.8	1.90	2.18	1.93
19	2.55	2.06	4.5	9.0	2.8	2.6	2.20	1.92	2.45	1.92	1.97	2.23
20	2.43	2.06	10.2	5.3	2.8	2.9	2.08	1.92	2.35	1.96	1.98	2.33
21	2.37	2.08	14.2	4.1	2.7	3.0	1.99	1.88	2.6	2.03	1.97	5.08
22	2.35	2.06	9.4	3.35	2.65	2.9	2.00	1.98	2.24	1.96	1.94	4.58
23	2.30	2.14	4.2	4.6	2.6	2.8	2.35	2.6	2.28	1.96	1.94	2.96
24	2.29	2.06	3.6	5.4	2.65	2.8	2.22	2.36	2.05	1.90	1.92	2.43
25	2.45	2.08	3.2	9.1	2.7	2.6	2.32	2.35	2.02	1.90	1.90	2.33
26	2.39	2.08	3.0	6.0	2.8	2.6	2.28	3.0	1.92	1.90	1.90	2.26
27	2.37	2.08	2.9	5.0	2.8	2.6	2.22	4.1	1.90	1.88	1.88	3.56
28	2.31	2.09	2.65	4.1	2.7	2.5	2.26	2.9	1.92	1.88	1.89	4.40
29	2.27	2.09	5.1	3.5	.....	2.5	2.25	2.7	1.82	1.84	1.82	3.23
30	2.27	2.15	9.8	3.4	.....	2.45	2.25	2.8	1.85	1.84	1.83	2.76
31	2.20	.....	5.0	7.8	.....	2.40	.....	2.65	.....	1.76	1.82	.....

NOTE.—Discharge relation probably not materially affected by ice.

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 to September 30, 1915.

GAGE.—Vertical and inclined staff on left bank 200 feet above bridge; read twice daily, to hundredths, by Irene Call.

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

CHANNEL AND CONTROL.—One channel except at extreme high stages when both banks overflow; 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. Point of zero flow, gage height, 1.2 feet±0.2 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 11.20 feet at 6 p. m., September 8, and at 6 a. m., September 9. Minimum stage recorded, 2.25 feet at 6 a. m., July 28.

High-water marks indicate maximum stage of about 24.5 feet.

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Raccoon Creek at Adamsville, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 25	C. E. Ellsworth	2.70	145
27	Ellsworth and Conklin	2.55	102

Daily gage height, in feet, of Raccoon Creek at Adamsville, Ohio, for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		3.9	2.55	2.75	16		3.45	4.8	2.8
2		7.3	2.75	2.7	17		2.95	4.0	2.85
3		7.8	2.7	2.55	18		3.15	3.15	2.8
4		6.3	2.75	2.7	19		2.95	2.9	2.8
5		4.8	2.65	4.4	20		2.85	2.8	4.8
6		4.8	2.55	7.2	21		2.6	2.55	4.2
7		4.2	2.48	9.1	22		2.5	2.75	3.4
8		5.6	2.42	11.1	23		2.55	2.9	2.85
9		6.5	2.44	10.4	24		2.55	3.1	2.7
10		5.9	2.5	6.4	25	2.7	2.55	2.9	2.55
11		4.9	4.0	4.3	26	2.65	2.38	3.6	2.45
12		4.4	3.0	3.7	27	2.55	2.36	4.4	3.2
13		4.6	5.9	3.35	28	2.5	2.34	3.15	3.6
14		3.6	7.4	3.45	29	2.55	2.47	2.9	3.3
15		4.0	5.6	3.1	30	3.9	2.70	2.75	3.0
					31		2.75	2.8	

GUYANDOT RIVER BASIN.

GUYANDOT RIVER AT WILBER, W. VA.

LOCATION.—At site of Hutchinson Lumber Co.'s suspension bridge at Wilber, 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 to September 30, 1915.

GAGE.—Vertical and inclined staff on right bank; read twice daily, to hundredths, 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 suspension bridge or by wading. Suspension bridge removed about September 1. Cable installed between towers of former bridge in February, 1916.

CHANNEL AND CONTROL.—One channel at all stages, but water flows around both bridge piers at extreme high stages; straight for about 1,000 feet above and 500 feet below station. Both banks high, steep, and do not overflow. Bed of river composed of solid rock, boulders, and mud; control probably permanent; point of zero flow, gage height 0.00±0.5 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 5.13 feet at 7.10 p. m. July 21; minimum, 1.61 feet at 7.10 a. m. September 16.

Highest flood known reached a stage represented by gage height about 24 feet.

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Guyandot River at Wilber, W. Va., during the year ending Sept. 30, 1915.

[Made by C. E. Ellsworth.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 11	2.93	352
13	3.25	503

Daily gage height, in feet, of Guyandot River at Wilber, W. Va., for the year ending Sept. 30, 1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	2.12	1.80	11	.....	1.75	2.18	21	5.12	2.00	2.01
2	.....	2.11	1.80	12	.....	1.82	2.16	22	4.60	2.10	2.16
3	.....	2.10	1.80	13	3.21	2.18	2.46	23	3.86	1.91	2.37
4	.....	2.39	1.88	14	3.26	2.22	1.90	24	3.43	1.80	2.62
5	.....	2.16	2.48	15	3.16	2.44	1.76	25	3.14	1.71	2.22
6	.....	2.05	3.45	16	3.26	2.45	1.66	26	3.15	1.70	2.04
7	.....	2.00	3.20	17	3.26	2.22	1.72	27	3.10	1.66	1.94
8	.....	1.92	2.95	18	3.74	2.22	1.76	28	3.14	1.78	1.76
9	.....	1.88	2.60	19	3.56	2.24	1.84	29	3.14	1.89	1.82
10	.....	1.86	2.44	20	4.17	2.00	1.76	30	2.55	1.72	1.82
								31	2.33	1.81	.....

GUYANDOT RIVER AT BRANCHLAND, W. VA.

LOCATION.—At highway bridge at Branchland, Lincoln County, on the Chesapeake & Ohio Railway. 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 to September 30, 1915.

GAGE.—Chain gage fastened to handrail on upstream side of bridge near center of main span; read twice daily, to hundredths, by C. D. Moore.

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

CHANNEL AND CONTROL.—Bed of stream is composed of rock, gravel, sand and mud and is fairly permanent.

EXTREMES OF STAGE.—Maximum stage recorded, 7.75 feet at 7.55 a. m. July 23; minimum, 2.36 feet at 7.25 a. m. September 20.

Highest flood known reached a stage represented by gage height of about 44 feet.

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determination of daily discharge.

Discharge measurements of Guyandot River at Branchland, W. Va., during the year ending Sept. 30, 1915.

[Made by Ellsworth and Conklin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 7	4.05	679
9	4.64	1,020

Daily gage height, in feet, of Guyandot River at Branchland, W. Va., for the year ending Sept. 30, 1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	3.16	2.48	11	3.88	2.76	3.25	21	5.82	2.78	2.80
2	.....	3.00	2.50	12	3.84	2.44	3.12	22	6.90	2.58	2.76
3	.....	3.22	2.68	13	3.82	2.70	3.02	23	6.38	2.50	2.67
4	.....	3.48	2.88	14	3.94	2.62	2.78	24	4.32	2.65	2.69
5	.....	3.40	3.22	15	3.82	3.04	2.85	25	3.95	2.65	2.87
6	.....	3.05	3.37	16	3.78	3.12	2.70	26	3.68	2.52	2.98
7	.....	2.95	3.98	17	3.88	3.07	2.77	27	3.50	2.52	2.92
8	4.68	2.84	3.84	18	3.90	3.30	2.60	28	3.21	2.50	2.86
9	4.46	2.62	3.70	19	4.20	3.12	2.45	29	3.16	2.59	2.76
10	4.06	2.62	3.45	20	4.18	2.94	2.48	30	2.88	2.50	2.69
								31	3.05	2.50	.....

MUD RIVER AT YATES, W. VA.

LOCATION.—About 200 feet above the highway bridge at Yates, Cabell County, 2 miles above Howell mill dam, and 15 miles from Huntington, on Chesapeake & Ohio Railway.

DRAINAGE AREA.—318 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 19 to September 30, 1915.

GAGE.—Vertical and inclined staff on left bank; read twice daily, to hundredths, by C. J. McDonie.

DISCHARGE MEASUREMENTS.—Made from single-span steel highway bridge below gage. Stay wire used for measurements at high stages.

60399°—WSP 403—17——6

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. Left bank high, steep, wooded, and does not overflow. Principal control at ford, about 100 feet below gage; probably fairly permanent. Point of zero flow, gage height, 1.0±0.1 foot.

EXTREMES OF STAGE.—Maximum stage recorded, 5.15 feet at 7 p. m. August 18; minimum, 1.60 feet at 7 p. m. August 14.

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

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Records good.

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

Data inadequate for determining daily discharge.

Discharge measurements of Mud River at Yates, W. Va., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 14	C. E. Ellsworth	2.32	51.1
16	.....do	2.30	44.1
19	Ellsworth and Conklin	2.01	22.4

Daily gage height, in feet, of Mud River at Yates, W. Va., for the year ending Sept. 30, 1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	1.92	1.98	11	.....	1.87	2.16	21	2.9	2.30	2.34
2	.....	1.98	1.92	12	.....	1.80	2.10	22	2.60	2.20	2.64
3	.....	2.84	2.32	13	.....	1.64	2.01	23	2.35	2.08	2.39
4	.....	2.59	2.41	14	.....	1.63	2.06	24	2.20	2.04	2.10
5	.....	2.56	4.7	15	.....	1.98	2.04	25	2.10	2.02	2.09
6	.....	2.36	4.1	16	.....	1.80	1.90	26	2.02	1.93	2.04
7	.....	2.18	3.45	17	.....	1.98	1.81	27	2.00	1.88	2.37
8	.....	2.10	2.75	18	.....	4.2	1.78	28	1.94	1.95	2.35
9	.....	2.00	2.46	19	2.06	3.1	1.82	29	1.98	2.13	2.14
10	.....	1.93	2.28	20	3.1	2.46	2.17	30	1.92	2.03	2.18
								31	1.90	1.96	.....

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 to September 30, 1915.

GAGE.—Chain gage attached to upstream handrail about 90 feet from left abutment; read twice daily, to hundredths, by Byron Smith.

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

CHANNEL AND CONTROL.—One channel at all stages; straight for about 80 feet above and 1,200 feet below bridge. Both banks high, steep, wooded, and do not overflow. Bed of stream composed of rock and sand. Principal control is at Sampson's mill dam; probably permanent, but at low stages the operation of the mill will affect the discharge relation

EXTREMES OF STAGE.—Maximum stage recorded, 9.4 feet at 7 p. m. July 8; minimum, 1.39 feet at 6 p. m. September 23.

Highest flood known reached a stage represented approximately by gage height 25 feet.

WINTER FLOW.—No information available.

DIVERSIONS.—None.

REGULATION.—None, except for backwater caused during low water periods by operation of small power plant at Sampson's mill.

ACCURACY.—Records good. See "Channel and control" and "Regulation."

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

Data inadequate for determining daily discharge.

Discharge measurements of Twelvepole Creek at Wayne, W. Va., during the year ending Sept. 30, 1915.

[Made by Ellsworth and Conklin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 30	5.37	677
July 2	3.14	167
17	2.30	52.2

Daily gage height, in feet, of Twelvepole Creek at Wayne, W. Va., for the year ending Sept. 30, 1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	4.7	2.48	1.81	11	3.25	2.14	1.63	21	3.0	2.03	1.46
2	3.3	2.26	1.79	12	2.95	2.13	1.60	22	2.85	1.91	1.42
3	3.7	2.95	1.77	13	2.8	2.26	1.56	23	2.45	1.94	1.40
4	3.8	4.6	1.71	14	2.6	2.15	1.60	24	2.26	1.74	1.46
5	2.22	3.05	1.64	15	2.47	2.57	1.62	25	2.20	1.67	1.44
6	2.41	2.55	1.71	16	2.34	2.55	1.53	26	2.07	1.66	1.43
7	2.10	2.30	2.04	17	2.30	2.34	1.44	27	2.02	1.84	1.52
8	8.3	2.31	1.93	18	2.22	2.37	1.43	28	1.97	1.75	1.54
9	5.0	2.14	1.84	19	2.20	2.19	1.44	29	2.08	1.81	1.58
10	3.6	2.07	1.67	20	2.20	2.10	1.48	30	2.03	1.98	1.62
								31	2.05	1.97	.....

LITTLE MIAMI RIVER BASIN.

LITTLE MIAMI RIVER AT PLAINVILLE, OHIO.

LOCATION.—At the steel highway bridge about half a mile above the Pennsylvania Railroad station at Plainville, Hamilton County.

DRAINAGE AREA.—1,680 square miles.

RECORDS AVAILABLE.—July 10 to September 30, 1915.

GAGE.—Chain gage attached to downstream side of bridge; read morning and evening to quarter-tenths.

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

CHANNEL AND CONTROL.—Channel consists of heavy gravel and rock, covered with layer of mud. Control is at a riffle about 600 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 21.15 feet February 1, 1915 (discharge, 42,800 second-feet); minimum stage, 5.1 feet May 8, 9, 13, and 14, 1915 (discharge, 19 second-feet).

ACCURACY.—Results good, except for a few days in January and February, when the discharge relation may have been affected by backwater due to high stages in the Ohio River.

COOPERATION.—Results of discharge measurements and daily gage-height record furnished by United States Public Health Service.

Discharge measurements of Little Miami River at Plainville, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	Ellsworth and Streeter.	5.40	51.9	Feb. 1	Streeter and Roth.....	21.15	42,500
19	H. W. Streeter.....	8.3	1,500	Aug. 12	Streeter and Tiedeman.	13.4	12,900

Daily discharge, in second-feet, of Little Miami River at Plainville, Ohio, for the years ending Sept. 30, 1914–1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1914.				1914.				1914.			
1.....	.....	79	722	11.....	110	85	146	21.....	153	57	65
2.....	.....	71	510	12.....	92	68	137	22.....	131	62	66
3.....	.....	72	357	13.....	110	99	124	23.....	110	85	65
4.....	.....	57	261	14.....	1,590	200	68	24.....	114	87	89
5.....	.....	58	207	15.....	510	118	92	25.....	99	1,180	76
6.....	.....	64	158	16.....	322	89	89	26.....	79	1,100	82
7.....	.....	62	187	17.....	261	76	81	27.....	81	418	76
8.....	.....	62	153	18.....	192	71	65	28.....	87	1,280	78
9.....	.....	65	146	19.....	158	68	71	29.....	72	16,700	82
10.....	110	68	131	20.....	187	64	52	30.....	81	3,250	87
								31.....	82	1,280	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1.....	58	170	124	3,250	40,600	290	290	261	5,520	638	1,100	207
2.....	52	158	182	1,280	30,880	261	261	233	3,620	4,870	1,100	114
3.....	65	146	207	750	13,900	233	261	207	2,560	1,480	1,710	79
4.....	72	114	376	693	9,040	207	261	182	1,590	946	1,100	65
5.....	58	104	3,250	534	.....	585	261	158	1,100	9,900	638	12,600
6.....	65	158	2,100	811	.....	1,180	233	79	693	2,250	439	9,320
7.....	46	146	1,280	18,500	.....	1,830	261	135	534	811	290	5,740
8.....	65	146	1,100	8,470	.....	1,480	290	19	811	6,180	357	14,900
9.....	72	114	1,280	1,960	.....	1,280	322	19	485	4,240	1,180	8,190
10.....	65	207	1,180	1,100	.....	811	290	158	322	2,250	693	7,140
11.....	72	182	876	1,480	.....	946	290	135	290	1,710	946	4,030
12.....	58	158	722	1,960	.....	876	322	135	534	1,280	10,200	946
13.....	87	170	585	2,890	5,300	811	396	19	396	946	3,250	693
14.....	114	124	638	2,250	6,180	638	439	19	693	638	2,560	485
15.....	3,620	158	439	1,960	4,440	585	357	182	7,140	1,280	3,430	396
16.....	7,390	194	396	1,280	2,560	585	357	207	3,620	1,100	2,890	322
17.....	2,890	220	357	4,870	1,960	534	322	207	1,180	946	2,560	439
18.....	2,890	135	357	5,520	1,590	485	322	207	946	811	1,960	750
19.....	1,480	124	357	4,030	1,280	485	261	158	811	693	1,710	1,830
20.....	946	158	357	3,070	811	638	182	207	1,020	585	1,710	1,280
21.....	666	146	462	1,960	946	693	65	207	946	485	3,620	946
22.....	560	124	612	693	811	693	135	261	876	322	3,250	811
23.....	357	158	1,020	1,370	811	638	95	693	811	261	2,560	693
24.....	290	158	1,020	1,960	693	585	79	693	485	233	2,560	585
25.....	220	114	1,020	1,710	585	322	322	638	396	207	6,180	396
26.....	510	146	1,020	1,480	485	396	439	585	357	158	2,890	290
27.....	439	104	1,020	1,100	396	322	396	4,440	290	114	1,280	1,280
28.....	418	135	534	811	322	322	322	2,890	290	95	693	1,480
29.....	261	114	534	693	.....	322	290	1,100	261	534	485	1,100
30.....	220	124	8,750	693	.....	290	290	1,480	811	1,100	396	811
31.....	194	.....	6,180	1,710	.....	290	.....	2,890	.....	693	261	.....

NOTE.—Discharge determined from a rating curve well defined between 50 and 250 second-feet and fairly well defined between 250 and 50,000 second-feet.

Discharge, Feb. 5–12, estimated, because of backwater from Ohio River, at 12,400 second-feet. Discharge Jan. 12–16 and 22–25 may be too high because of possible backwater from Ohio River; open-water rating curve applied throughout these periods.

Monthly discharge of Little Miami River at Plainville, Ohio, for the years ending Sept. 30, 1914–15.

[Drainage area, 1,680 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914.						
July 10–31	1,590	72	215	0.128	0.10	B.
August	16,700	57	874	.520	.60	B.
September	722	52	151	.090	.10	A.
1914–15.						
October	7,390	46	784	0.467	0.54	B.
November	220	104	147	.088	.10	A.
December	8,750	124	1,240	.738	.85	B.
January	18,500	534	2,610	1.55	1.79	C.
February	40,600	322	7,950	4.73	4.92	C.
March	1,830	207	633	.377	.43	B.
April	439	65	280	.167	.19	B.
May	4,440	19	607	.361	.42	B.
June	7,140	261	1,310	.780	.87	B.
July	9,900	95	1,540	.917	1.06	B.
August	10,200	261	2,060	1.23	1.42	B.
September	14,900	65	2,600	1.55	1.73	B.
The year	40,600	19	1,770	1.05	14.32	

NOTE.—See footnote to table of daily discharge.

LICKING RIVER BASIN.

LICKING RIVER AT FALMOUTH, KY.

LOCATION.—At the highway bridge on Ferry Street, about 500 feet above mouth of South Fork.

DRAINAGE AREA.—2,290 square miles.

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening.

DISCHARGE MEASUREMENTS.—Made from bridge, from boat, or by wading, according to stage.

CHANNEL AND CONTROL.—Fairly permanent.

EXTREMES OF STAGE.—Maximum stage recorded 1914–15, 24.6 feet, February 2, 1915; minimum stage, 1.0 foot July 11 to 16 and September 30, 1914.

The flood of 1854 reached a stage of 38.0 feet, according to the United States Weather Bureau.

WINTER FLOW.—Discharge relation probably not materially affected by ice.

ACCURACY.—Discharge relation may be affected by backwater during high water in South Fork.

COOPERATION.—Results of discharge measurements and daily gage-height record furnished by the United States Public Health Service.

Data inadequate for determining daily discharge.

Discharge measurements of Licking River at Falmouth, Ky., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 30	Tarbett and Roth	7.82	7,100
Jan. 25	Streeter and Roth	9.30	9,460

Daily gage height, in feet, of Licking River at Falmouth, Ky., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.1	1.7	2.0	8.4	24.5	2.5	2.9	2.4	4.5	2.4	2.1	3.4
2	1.2	1.7	1.8	6.6	24.6	2.4	2.8	2.5	4.6	3.0	2.7	2.8
3	1.2	1.7	1.5	5.0	17.9	2.4	2.7	5.7	9.7	5.2	2.6	2.5
4	1.1	1.6	5.5	3.8	13.9	2.3	2.6	3.7	9.0	6.1	4.8	2.2
5	1.1	1.6	4.3	3.5	12.5	3.5	2.5	3.7	6.8	7.0	4.8	2.3
6	1.1	1.6	4.5	3.2	12.9	9.7	2.5	3.8	4.2	6.2	3.9	5.0
7	1.1	1.5	4.1	7.5	9.4	10.7	2.4	3.5	3.6	5.4	3.0	3.5
8	1.1	1.5	3.8	8.2	7.2	8.9	2.4	5.8	3.2	22.5	2.6	3.9
9	1.1	1.5	3.3	7.5	5.3	7.0	2.3	5.5	3.0	9.6	2.3	3.2
10	1.1	1.4	3.0	6.0	4.8	4.9	2.3	3.9	3.5	12.5	2.1	3.1
11	1.2	1.4	2.9	4.5	4.5	4.5	2.3	3.5	5.0	18.3	2.2	2.7
12	1.5	1.4	2.8	7.6	4.3	4.3	2.3	2.9	5.6	11.5	2.0	2.5
13	1.7	1.4	2.7	10.6	4.0	4.0	2.3	2.6	3.9	5.4	2.6	2.3
14	2.0	1.4	2.6	9.9	3.5	3.5	2.5	2.5	3.5	5.0	2.2	2.1
15	8.2	1.4	2.5	8.4	3.3	3.1	2.6	2.4	4.6	4.5	2.2	2.0
16	15.5	1.4	.....	6.7	3.3	3.1	2.5	2.3	3.6	4.0	2.9	1.9
17	10.5	1.4	.....	5.7	3.3	3.1	2.4	2.2	3.6	3.7	2.6	1.8
18	11.2	1.3	.....	5.0	3.3	3.0	2.4	2.1	3.6	3.5	5.5	1.7
19	7.2	1.3	2.2	6.8	3.3	3.0	2.4	2.1	3.5	3.2	4.0	1.7
20	4.9	1.3	5.9	9.4	3.2	3.4	2.3	2.0	3.5	2.7	3.8	2.2
21	3.6	1.3	14.8	9.2	3.1	3.6	2.3	2.0	3.9	2.4	4.1	2.0
22	3.2	1.3	14.7	7.5	2.9	4.0	2.2	3.1	2.9	2.2	3.7	1.8
23	2.8	1.3	11.3	8.8	2.9	4.3	3.0	6.8	2.8	2.2	3.7	1.7
24	2.5	1.3	8.7	9.7	2.8	4.0	2.5	4.8	2.5	2.1	3.9	1.6
25	2.3	1.3	6.2	9.6	2.8	3.6	2.4	4.7	2.3	3.1	5.2	1.6
26	2.2	1.3	4.0	7.2	2.7	3.3	2.4	7.7	2.2	3.0	4.8	1.5
27	2.1	1.3	3.8	5.5	2.6	3.2	2.4	11.4	2.0	2.4	3.6	1.5
28	2.0	1.3	3.6	4.5	2.5	3.1	2.4	8.2	1.9	2.3	3.0	1.7
29	1.9	1.3	3.5	4.0	.....	3.1	2.4	7.0	2.0	2.2	2.6	1.6
30	1.8	1.8	8.7	3.7	.....	3.0	2.3	6.0	5.0	2.2	2.5	1.5
31	1.8	.....	9.8	4.3	.....	2.9	.....	4.5	.....	2.0	2.7	.....

NOTE.—Dec. 16–18 river frozen and gage not read.

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 September 30, 1915.

GAGE.—Inclined staff fastented to posts on right bank; read daily, morning and evening, to half-tenths, 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, 5.6 feet at 7 a. m. February 1; minimum, 1.10 feet at 6 p. m. November 27.

WINTER FLOW.—Discharge relation affected by ice during severe winters.

ACCURACY.—Gage height record reliable.

COOPERATION.—Station maintained in cooperation with the division of sewerage investigation of the Department of Public Service of the city of Cincinnati, Ohio.

Data inadequate for determining daily discharge.

No discharge measurements were made during the year.

Daily gage height, in feet, of Mill Creek at Arlington Heights, Ohio, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.20	1.22	1.18	1.20	5.30	1.18	1.20	1.20	1.20	1.20	1.22	1.20
2	1.20	1.20	1.15	1.20	3.72	1.18	1.20	1.20	1.20	1.20	1.18	1.20
3	1.20	1.15	1.15	1.22	2.30	1.20	1.20	1.18	1.22	1.22	1.20	1.20
4	1.25	1.20	1.82	1.25	1.80	1.20	1.20	1.22	1.20	1.20	1.22	1.20
5	1.22	1.18	1.55	1.25	4.65	2.95	1.20	1.20	1.20	1.22	1.20	4.30
6	1.20	1.20	1.30	1.28	1.75	1.60	1.20	1.20	1.20	1.20	1.20	1.45
7	1.20	1.40	1.20	1.45	1.20	1.20	1.20	1.20	1.20	1.20	1.20	3.80
8	1.22	1.28	1.15	1.22	1.22	1.22	1.20	1.22	1.22	1.25	1.20	2.35
9	1.20	1.22	1.15	1.20	1.28	1.18	1.22	1.20	1.20	2.10	1.20	1.22
10	1.22	1.20	1.20	1.26	1.20	1.20	1.25	1.22	1.18	1.22	1.22	1.20
11	1.20	1.20	1.20	1.22	1.22	1.20	1.20	1.20	1.20	1.20	1.25	1.22
12	1.25	1.20	1.20	1.20	1.20	1.20	1.22	1.18	1.20	1.20	1.22	1 28
13	1.22	1.20	1.20	1.20	1.20	1.22	1.20	1.20	1.22	1.20	1.25	1 20
14	1.22	1.20	1.20	1.20	1.22	1.22	1.20	1.20	1.22	1.20	1.22	1 20
15	2.18	1.20	1.25	1.20	1.25	1.20	1.22	1.22	1.22	1.20	1.20	1 18
16	1.55	1.20	1.20	1.28	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.22
17	1.30	1.20	1.20	1.75	1.20	1.22	1.20	1.20	1.20	1.20	3.35	1.20
18	1.20	1.20	1.20	1.28	1.20	1.22	1.22	1.20	1.25	1.20	1.80	1.22
19	1.20	1.18	1.20	1.25	1.20	1.20	1.20	1.28	3.75	1.20	1.25	1.20
20	1.20	1.15	1.20	1.18	1.20	1.20	1.20	1.25	1.62	1.20	1.22	1.20
21	1.22	1.15	1.20	1.20	1.22	1.20	1.20	1.23	1.22	1.20	1.20	1.32
22	1.20	1.20	1.20	1.20	1.25	1.20	1.20	1.20	1.20	1.20	1.20	1.22
23	1.20	1.18	1.20	1.22	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
24	1.20	1.15	1.20	1.20	1.20	1.20	1.25	1.20	1.20	1.20	1.22	1.20
25	1.22	1.15	1.20	1.20	1.20	1.22	1.20	1.20	1.20	1.20	1.28	1.20
26	1.22	1.18	1.20	1.20	1.20	1.20	1.20	2.65	1.28	1.20	1.20	1.20
27	1.25	1.20	1.20	1.18	1.22	1.20	1.20	1.22	1.22	1.22	1.50	1.68
28	1.22	1.20	1.20	1.20	1.20	1.22	1.20	1.20	1.22	1.20	1.28	1.22
29	1.20	1.20	1.20	1.22	.....	1.20	1.22	1.20	1.20	1 22	1.22	1.20
30	1.20	1.20	1.20	1.40	.....	1.22	1.20	1.20	1.22	1.20	1.22	1.40
31	1.20	.....	1.20	3.75	.....	1.20	.....	1.20	.....	1.20	1.20	.....

MIAMI RIVER BASIN.

MIAMI RIVER AT SIDNEY, OHIO.

LOCATION.—At the North Street Bridge, Sidney, Ohio.

DRAINAGE AREA.—555 square miles.

RECORDS AVAILABLE.—February 1, 1914, to September 30, 1915.

GAGE.—Vertical staff attached to downstream side of west abutment; read daily, in the morning, to tenths. Elevation of zero of gage, 926.6 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.—Shifts during floods.

EXTREMES OF DISCHARGE.—1914–15: Maximum stage recorded, 6.2 feet April 8, 1914 (discharge, 5,050 second-feet); minimum stage recorded, 0.3 foot July 9, August 9 and 21, and September 7, Nov. 1–8, 19–26, and 29, 1914 (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.

WINTER FLOW.—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 (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 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. On July 8, 1914, the flow of the canal was measured by an engineer of the Morgan Engineering Co. and found to be 27.9 second-feet.

ACCURACY.—Records only fair, because of shifting of channel.

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 years ending Sept. 30, 1914 and 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1914.		*Feet.*	*Sec.-ft.*
Mar. 3	I. E. Houk	2.7	1,160	Aug. 24	H. R. Daubenspeck	0.6	45.4
Apr. 7	H. R. Daubenspeck	5.05	4,350	24	do	.55	40.1
8	do	6.2	5,050	Sept. 4	do	.6	47.1
23	do	1.0	151	4	do	.6	47.3
May 6	do	2.15	850	25	do	.8	70.4
6	do	2.2	928	25	do	.8	71.8
6	do	2.2	[a]964				
6	do	2.2	[a]971	1914–15.			
29	do	1.0	[a]152	Oct. 26	do	.9	[a]153
June 16	do	.55	[a]20.8	Dec. 1	do	.4	[c]24
25	do	.6	[b]36.5	Jan. 8	E. W. Lane	3.4	[d]1,600
25	do	.6	36.9	Feb. 18	H. R. Daubenspeck	1.5	[a]493
July 9	do	.5	30.1	Apr. 7	do	−.16	[a]41
9	do	.5	29.7	May 13	B. H. Petty	−.45	[c]37
20	do	.6	39.4	June 22	do	.98	[a]282
20	do	.6	39.1	22	do	.92	[d]324
31	do	.5	35.8	Sept. 10	do	2.38	[d]957
31	do	.5	33.1	10	do	2.35	[a]1,030
Aug. 12	do	1.12	[a]213				

[a] Measurement made from highway bridge 1,000 feet below gage.
[b] Measurements June 16 to Sept. 30, 1914, except that on Aug. 12, made by wading 2,000 feet below gage.
[c] Made by wading.
[d] Made from downstream side of North Street Bridge at gage.

Daily discharge, in second-feet, of Miami River at Sidney, Ohio, for the years ending Sept. 30, 1914 and 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914.								
1	1,080	375	1,160	57	111	30	23	80
2	1,240	440	4,110	41	80	30	23	57
3	930	375	2,900	30	57	23	23	57
4	785	375	1,960	30	57	23	23	41
5	855	575	1,400	41	57	23	30	30
6	855	855	1,000	375	41	23	23	23
7	1,000	1,760	1,670	930	30	23	23	18
8	930	1,160	5,050	715	30	23	23	57
9	785	1,160	4,220	1,580	41	18	18	152
10	645	1,000	2,570	1,580	30	23	575	152
11	575	785	1,580	1,860	23	23	440	152
12	505	930	1,670	715	23	23	200	152
13	575	785	1,400	1,240	23	23	152	152
14	645	1,240	1,160	1,490	23	30	57	200
15	645	2,460	930	1,240	23	80	57	200
16	575	2,680	930	785	30	80	41	152
17	645	1,860	645	505	30	41	30	152
18	645	1,160	440	440	30	41	23	200
19	785	715	315	375	23	30	23	255
20	645	505	255	315	23	30	23	255
21	505	375	152	255	23	23	18	255
22	505	315	111	200	23	23	23	200
23	440	255	111	152	30	23	23	200
24	440	255	80	152	30	23	30	152
25	440	200	57	111	23	23	255	80
26	440	200	152	111	23	152	80	80
27	375	255	111	111	30	57	41	152
28	440	3,780	80	152	30	41	41	255
29	.....	3,120	80	200	41	30	80	200
30	.....	2,460	80	111	41	23	200	200
31	.....	1,860	.....	80	.....	30	111	.....

Daily discharge, in second-feet, of Miami River at Sidney, Ohio, for the years ending Sept. 30, 1914 and 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	200	18	23	375	2,120	282	165	53	251	42	158	315
2	200	18	23	152	3,730	251	165	53	221	457	193	315
3	200	18	23	152	3,840	251	141	73	755	251	1,070	235
4	315	18	41	111	2,770	221	141	62	590	165	590	158
5	315	18	57	80	1,870	221	141	53	420	315	497	158
6	200	18	315	152	4,180	221	120	62	251	282	349	1,280
7	200	18	375	1,950	3,080	420	86	47	540	221	315	810
8	255	18	255	1,710	1,870	497	73	62	540	3,960	285	384
9	255	41	255	1,420	1,210	420	62	53	315	2,670	259	497
10	255	41	255	935	870	384	47	47	192	1,790	213	1,140
11	200	30	255	540	700	349	221	47	141	1,070	213	540
12	255	30	200	420	1,950	315	251	47	102	870	384	384
13	200	23	152	349	2,980	282	192	42	62	645	540	315
14	200	23	111	497	2,480	251	141	42	165	497	420	259
15	440	23	80	497	1,420	282	102	38	251	1,000	315	213
16	855	30	80	192	870	251	86	38	457	2,120	285	235
17	575	23	57	315	645	221	73	34	384	3,300	645	235
18	375	23	57	540	497	221	62	34	221	2,770	700	235
19	200	18	41	497	457	192	73	38	1,000	2,120	645	590
20	200	18	41	457	384	192	53	38	755	1,790	457	457
21	200	18	30	349	349	221	73	34	457	2,670	590	384
22	152	18	30	282	349	192	73	34	315	2,120	1,350	315
23	152	18	30	251	349	192	53	30	221	1,560	1,210	315
24	152	18	30	221	349	192	315	30	141	1,140	810	285
25	152	18	30	221	349	192	349	30	73	755	935	285
26	111	18	30	192	282	192	282	30	62	540	590	315
27	80	23	23	192	251	221	221	30	47	420	384	700
28	80	23	23	165	221	165	165	34	47	315	349	1,000
29	41	18	30	165	.....	192	120	38	42	259	315	700
30	30	23	57	165	.....	192	73	384	42	213	384	457
31	23	.....	505	165	.....	192	.....	349	.....	193	349	.....

NOTE.—Discharge determined from rating curves fairly well defined above 23 second-feet. New rating curves used beginning Jan. 6 and July 8, 1915. Discharge relation probably not materially affected by ice; open-water rating curves used throughout entire period.

Monthly discharge of Miami River at Sidney, Ohio, for the years ending Sept. 30, 1914 and 1915.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
1914.				
February	1,240	375	676	C.
March	3,780	200	1,110	C.
April	5,050	57	1,210	B.
May	1,860	30	515	B.
June	111	23	36	C.
July	152	18	35.1	B.
August	575	18	88.1	B.
September	255	18	144	C.
1914-15.				
October	855	23	228	C.
November	41	18	22.1	B.
December	505	23	113	B.
January	1,950	80	442	B.
February	4,180	221	1,440	B.
March	497	165	254	B.
April	349	47	137	C.
May	384	30	64.1	C.
June	1,000	42	302	B.
July	3,960	42	1,180	B.
August	1,350	158	510	B.
September	1,280	158	450	B.
The year	4,180	18	423	

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, 1915. 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 daily, in the morning, to tenths 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.—Channel shifts somewhat during floods.

EXTEMES OF DISCHARGE.—Maximum stage recorded during year, 7.8 feet July 8, 1915 (discharge, 12,300 second-feet); minimum stage, 0.4 foot November 23, 24, and 27 (discharge, 16 second-feet).

The flood of March-April, 1913, the highest known to have occurred at this station, reached a stage of 23.3 feet on March 25, referred to the gage datum.

WINTER FLOW.—Discharge relation affected by the ice during part of winter.

DIVERSIONS.—The water in the Miami & Erie canal—about 25 or 30 second-feet—flowing south from Sidney, is carried through a siphon under Loranne 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 to this quantity, about 40 or 50 second-feet is diverted into the lower canal level about 3 miles above the gage.

REGULATION.—Water is taken from the Miami & Erie canal for power development, but the effect of the regulation is not appreciable.

ACCURACY.—Gage-height record previous to October 1, 1914, unreliable; results October 1, 1914, to September 1, 1915, considered good.

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, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	H. R. Daubenspeck	1.5	119	Apr. 8	H. R. Daubenspeck	0.98	53
Dec. 1	do	.7	30	May 21	B. H. Petty	.99	45
Feb. 7	E. W. Lane	5.84	7,530	July 8	Pye and Hahs	8.20	12,500
18	H. R. Daubenspeck	2.1	690	Sept. 20	B. H. Petty	2.06	687

Daily discharge, in second-feet, of Miami River at Piqua, Ohio, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	260	35	35	150	1,870	100	50	85	780	85	120	370
2	150	29	35	150	6,650	85	50	70	370	780	780	260
3	190	29	42	150	7,080	85	50	70	1,870	920	2,540	190
4	370	29	42	150	6,020	85	50	70	1,710	500	2,720	120
5	500	24	50	150	4,210	70	50	60	1,390	920	1,550	100
6	260	29	260	150	8,420	500	42	50	640	920	920	4,600
7	260	29	640	3,260	5,400	780	42	50	370	500	500	3,080
8	260	24	500	3,450	4,210	500	35	50	1,550	12,300	500	1,870
9	370	29	500	2,720	3,080	260	35	50	920	6,650	370	1,070
10	370	35	370	1,550	2,030	260	35	50	640	4,800	260	2,200
11	260	42	370	1,390	1,390	190	85	50	370	1,870	190	1,550
12	190	42	190	500	3,830	150	70	50	150	3,080	1,550	780
13	260	35	260	370	5,000	120	70	50	100	2,200	1,390	370
14	150	35	260	260	4,210	120	60	42	85	2,030	920	190
15	920	35	.....	190	3,080	100	60	42	500	2,540	920	150
16	1,230	35	.....	120	2,030	100	60	42	1,230	4,800	780	500
17	1,070	42	.....	370	1,230	85	50	42	920	5,400	780	260
18	780	35	.....	780	920	70	50	42	640	4,600	1,390	190
19	370	29	.....	640	500	70	50	42	2,900	5,000	1,230	1,870
20	190	29	.....	370	260	60	50	42	2,200	3,640	920	780
21	150	24	.....	190	190	60	50	50	1,710	7,300	1,710	370
22	150	20	.....	120	150	60	50	60	1,070	5,000	3,450	260
23	120	16	.....	120	150	60	60	50	780	3,450	3,260	190
24	150	16	.....	120	150	60	100	50	370	2,370	2,540	190
25	100	20	.....	120	150	60	1,390	50	150	1,710	2,720	150
26	120	20	.....	120	120	60	1,710	50	100	1,230	1,870	150
27	120	16	.....	120	100	60	1,230	50	85	920	1,390	1,870
28	85	20	.....	100	100	60	370	42	70	640	640	2,540
29	85	24	.....	100	.....	60	190	50	70	370	500	1,550
30	70	29	.....	100	.....	50	120	1,070	85	190	640	780
31	42	.....	.....	120	.....	50	.....	1,070	.....	150	500	.....

NOTE.—Discharge determined from a rating curve fairly well defined above 24 second-feet. Discharge Dec. 15–31 estimated, because of ice, at 170 second-feet. Some ice on river Jan. 1–6 and 21–31; discharge for these periods may be somewhat high because of use of open-water rating curve.

Monthly discharge of Miami River at Piqua, Ohio, for the year ending Sept. 30, 1915.

[Drainage area, 842 square miles.]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
October	1,230	42	310	B.
November	42	16	28.5	B.
December	640	35	208	C.
January	3,450	100	587	C.
February	8,420	100	2,590	B.
March	780	50	143	C.
April	1,710	35	210	B.
May	1,070	42	117	B.
June	2,900	70	794	B.
July	12,300	85	2,800	B.
August	3,450	120	1,280	B.
September	4,600	100	952	C.
The year	12,300	16	824	

MIAMI RIVER AT TADMOR, OHIO.

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, 1915.

GAGE.—Vertical staff in two sections; read daily, in the morning, to tenths, 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, 11.9 feet at 11.30 a. m. February 2 and on February 6 (discharge, 11,400 second-feet); minimum stage, 1.8 feet November 28–30 and December 1–3 (discharge, 119 second-feet). Highest stage known, 25.4 feet, occurred March 25, 1913.

WINTER FLOW.—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.—Records reliable.

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, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	H. R. Daubenspeck....	2.5	348	Mar. 3	H. R. Daubenspeck....	2.9	492
Nov. 30	.....do.....	1.75	115	Apr. 6	.....do.....	2.3	268
Jan. 13	.....do.....	3.3	731	20	B. H. Petty.....	2.3	269
Feb. 6	B. H. Petty.....	11.7	11,000	May 14	.....do.....	2.08	[a] 186
10	.....do.....	5.1	2,090	Sept. 15	.....do.....	3.10	680
12	.....do.....	7.3	4,440				

[a] Made by wading. All others made from upstream side of National Pike bridge at gage.

Daily discharge, in second-feet, of Miami River at Tadmor, Ohio, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	168	297	119	.....	2,290	470	297	335	1,120	1,270	583	583
2	335	297	119	.....	11,200	470	297	335	1,050	2,110	421	583
3	335	261	119	.....	8,090	470	297	335	980	910	2,770	583
4	335	227	142	.....	6,430	376	297	335	1,750	910	1,750	421
5	421	196	421	168	5,110	376	297	335	1,270	583	1,350	376
6	421	168	524	168	11,400	910	261	297	583	1,120	1,120	3,900
7	421	168	645	2,570	6,430	980	261	297	583	910	910	2,110
8	421	168	709	3,570	4,890	1,270	261	297	1,270	6,430	645	1,930
9	421	196	774	2,870	3,370	980	261	297	1,270	9,470	583	2,110
10	335	227	774	2,570	2,570	840	297	297	910	4,890	583	3,070
11	335	227	774	2,110	2,290	583	421	227	910	3,570	583	1,930
12	335	227	774	1,670	3,900	583	470	168	583	2,470	910	1,270
13	421	196	645	645	6,070	470	421	168	335	2,110	1,670	980
14	421	196	.....	583	5,230	470	335	168	335	1,590	1,120	840
15	524	196	.....	583	4,120	470	335	168	470	1,270	910	645
16	910	196	.....	583	2,290	583	335	119	840	5,950	840	583
17	1,120	196	.....	709	1,430	524	297	119	583	5,230	774	583
18	980	196	.....	1,050	1,120	524	297	119	583	5,000	910	583
19	645	168	.....	980	980	524	297	119	583	6,190	1,120	1,190
20	470	168	.....	1,050	980	470	297	168	2,110	3,790	980	1,430
21	376	142	.....	583	840	470	297	168	1,750	7,220	1,120	910
22	376	142	.....	583	774	470	297	168	1,270	5,230	1,430	583
23	376	142	.....	980	840	421	335	168	1,270	4,340	3,070	583
24	376	142	.....	1,270	840	421	376	168	840	3,790	2,110	583
25	335	142	.....	1,270	774	421	980	168	583	2,670	4,120	583
26	335	142	.....	1,270	583	583	1,270	168	470	1,510	1,930	583
27	335	142	.....	1,270	583	470	1,270	168	335	1,270	1,430	1,930
28	335	119	.....	1,120	583	421	980	168	335	1,120	1,120	2,890
29	335	119	.....	1,120	.....	421	583	168	335	774	910	1,930
30	335	119	709	1,120	.....	376	1,120	583	583	774	583	1,270
31	335	.....	709	1,190	.....	335	.....	1,270	.....	583	583	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge estimated because of ice, as follows: Dec. 14–29, 350 second-feet; Jan. 1–4, 400 second-feet.

Monthly discharge of Miami River at Tadmor, Ohio, for the year ending Sept. 30, 1915.

[Drainage area, 1,130 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	1,120	168	439	0.388	0.45	A.
November	297	119	184	.163	.18	A.
December	774	119	437	.387	.45	D.
January	3,570	168	1,140	1.01	1.16	C.
February	11,400	583	3,430	3.04	3.17	B.
March	1,270	335	553	.489	.56	A.
April	1,270	261	461	.408	.46	A.
May	1,270	119	260	.230	.27	A.
June	2,110	335	863	.764	.85	A.
July	9,470	583	3,070	2.72	3.14	A.
August	4,120	421	1,260	1.12	1.29	A.
September	3,900	376	1,250	1.11	1.24	A.
The year	11,400	119	1,100	.973	13.21	

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.—2,450 square miles.

RECORDS AVAILABLE.—March 18, 1905, to December 31, 1909: April 1, 1913, to September 30, 1915.

GAGE.—Vertical staff attached to downstream end of first pier from left bank; read once daily, to tenths, by C. E. Wilson.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Practically permanent except during extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.0 feet on July 9 (discharge, 26,900 second-feet); minimum stage, 1.6 feet November 6–8, 23–30; December 1–2, and 24–29 (discharge, 280 second-feet). The flood of March–April, 1913, reached a stage of 28.1 feet on March 26.

WINTER FLOW.—Ice may affect the 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.

ACCURACY.—Records good.

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 Dayton, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	H. R. Daubenspeck	0.9	431	July 9	I. E. Houk	10.6	[a] 24,400
Nov. 12	do	.7	306	16	E. W. Lane	7.15	[a] 11,400
12	do	.7	309	Sept. 23	B. H. Petty	1.95	1,210
May 11	B. H. Petty	1.05	434				

[a] Channel obstructed by vegetation.

Daily discharge, in second-feet, of Miami River at Dayton, Ohio, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	350	350	280	965	3,690	1,240	635	710	2,870	2,050	1,140	1,140
2	350	350	280	965	18,800	1,240	635	710	2,710	2,560	1,060	1,140
3	350	350	315	965	20,200	1,140	635	710	2,420	2,420	3,200	1,060
4	350	315	315	965	13,700	1,060	635	710	3,200	1,830	2,290	965
5	350	315	1,060	875	10,700	1,140	635	790	2,290	2,050	2,560	1,140
6	395	280	1,620	565	23,800	2,170	635	710	1,520	2,050	1,620	4,850
7	395	280	1,420	6,510	17,900	3,540	635	635	1,330	1,830	1,420	5,670
8	445	280	1,330	5,650	10,300	2,420	635	635	1,940	15,500	1,330	4,080
9	445	315	1,420	3,690	6,810	2,170	635	635	2,170	26,900	1,330	2,870
10	445	315	1,330	2,710	5,370	1,830	635	635	1,620	11,700	1,140	5,050
11	500	315	1,330	2,170	4,120	1,720	790	635	1,240	6,810	1,060	3,900
12	395	315	1,140	1,720	7,120	1,620	965	500	1,060	5,050	1,330	2,420
13	395	315	1,140	1,420	13,700	1,330	1,060	445	875	3,720	2,870	1,720
14	395	315	1,060	1,240	9,340	1,240	875	395	565	2,710	2,170	1,520
15	1,060	315	965	1,140	7,120	1,240	790	395	1,060	3,200	1,720	1,330
16	1,720	350	790	1,140	5,650	1,240	710	445	3,200	12,400	1,420	1,140
17	1,720	350	710	1,830	3,690	1,140	710	445	2,050	10,800	1,240	1,330
18	1,330	315	565	2,420	2,910	1,060	710	445	1,620	6,570	1,420	1,140
19	1,060	315	565	2,050	2,420	1,060	710	445	2,170	9,650	1,420	1,330
20	875	315	565	1,830	2,050	1,060	710	445	4,080	7,050	1,330	2,560
21	710	315	500	1,330	1,830	1,060	710	445	2,560	10,800	1,720	1,940
22	565	315	395	1,060	1,620	965	710	565	2,050	8,040	5,670	1,420
23	500	280	315	790	1,620	875	790	500	1,420	5,460	6,110	1,240
24	445	280	280	1,060	1,720	875	790	445	1,240	3,900	3,900	1,140
25	445	280	280	1,240	1,720	790	1,060	445	1,060	2,870	4,270	1,060
26	445	280	280	1,240	1,620	790	1,830	445	875	2,170	3,030	965
27	445	280	280	1,240	1,420	710	1,330	445	790	1,830	2,170	1,240
28	445	280	280	1,240	1,330	710	1,140	445	565	1,620	1,720	7,790
29	395	280	280	1,240	.....	635	965	710	500	1,330	1,420	4,850
30	350	280	1,140	1,240	.....	710	710	2,290	2,050	1,420	1,140	2,560
31	350	.....	1,140	1,330	.....	635	.....	3,540	.....	1,240	1,140	.....

NOTE.—Discharge determined from a rating curve well defined between 250 and 3,000 second-feet and fairly well defined for higher stages. River frozen Dec. 15-31, but open at gage. Open-water rating used throughout the year.

Monthly discharge of Miami River at Dayton, Ohio, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
October	1,720	350	594	B.
November	350	280	304	B.
December	1,620	280	754	C.
January	6,510	565	1,740	C.
February	23,800	1,330	7,220	C.
March	3,540	635	1,270	B.
April	1,830	635	814	B.
May	3,540	395	702	B.
June	4,080	500	1,770	B.
July	26,900	1,240	5,730	B.
August	6,110	1,060	2,110	B.
September	7,790	965	2,350	B.
The year	26,900	280	2,080	

MIAMI RIVER AT HAMILTON, OHIO.

LOCATION.—At single-span highway bridge on High Street at Hamilton, Butler County.

DRAINAGE AREA.—3,580 square miles.

RECORDS AVAILABLE.—February 28, 1910, to September 30, 1915. Flood stages only, November 16, 1904, to February 27, 1910, reported by United States Weather Bureau.

GAGE.—Vertical staff attached to the south side of the temporary bridge about 100 feet below old gage site; read morning and evening to half-tenths, by C. A. Huber. Sea-level elevation of zero of gage 564.56 feet. 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, 10.6 feet February 2 (discharge, 31,200 second-feet); minimum stage, 2.1 feet October 1–12 (discharge, 430 second-feet). The maximum stage on record at this station occurred at 3 a. m. March 26, 1913, at gage height 38.5 feet, according to Miami Conservancy District.[1]

According to records of United States Weather Bureau, the highest stage prior to 1913 was 21.2 feet March 24, 1898.

WINTER FLOW.—Discharge relation affected by ice for short periods during severe weather only, as factory wastes probably keep the temperature of the water above the freezing point.

DIVERSIONS.—The Miami & Erie canal is fed by water taken from Miami River at Middletown and Miamisburg, Ohio. The quantity diverted is not known, but it is probably a considerable part of the low-water flow.

REGULATION.—There are several power plants in Hamilton above the station, but all the water is returned to the river above the gage.

ACCURACY.—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. Results for 1915 are excellent.

COOPERATION.—Results of discharge measurements furnished by Miami Conservancy District.

Discharge measurements of Miami River at Hamilton, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 8	Hoskins and Tarbett [a]	[c] 4.80	7,080	May 17	B. H. Petty [b]	2.44	831
Feb. 6	do.[a]	[d] 10.40	33,800	Aug. 2	do.[b]	3.11	1,790
Mar. 1	H. R. Daubenspeck [b]	3.1	1,850	Sept. 21	do.[b]	3.44	2,590
Apr. 22	B. H. Petty [b]	2.5	798				

[a] U. S. Public Health Service.
[b] Engineers Miami Conservancy District.
[c] Lower gage, 5.75 feet.
[d] Lower gage.

[1] For information relating to this flood, see U. S. Geol. Survey Water-Supply Paper 334.

Daily discharge, in second-feet, of Miami River at Hamilton, Ohio, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	430	620	520	1,390	18,600	1,850	1,000	1,300	5,850	1,150	1,850	2,080
2	430	620	520	1,300	31,200	1,650	1,000	1,300	8,400	2,080	1,850	2,080
3	430	520	520	1,300	26,200	1,650	1,000	1,300	5,150	3,600	3,600	1,850
4	430	520	520	1,300	20,300	1,480	1,000	1,300	4,800	2,300	3,600	1,650
5	430	520	1,300	1,150	23,400	3,050	1,000	1,150	3,600	2,080	3,050	4,500
6	430	520	2,080	3,600	29,800	3,900	1,000	1,150	2,550	2,080	2,080	14,600
7	430	520	2,080	9,520	21,600	4,500	1,000	1,150	2,080	1,850	1,850	8,400
8	430	520	2,300	6,900	13,400	4,200	1,000	1,150	2,080	28,900	1,850	7,280
9	430	520	2,080	5,150	9,900	3,300	1,000	1,080	2,080	27,500	2,080	6,200
10	430	520	2,080	3,600	6,900	3,050	1,000	1,080	1,850	17,400	1,650	10,300
11	430	520	1,850	2,800	6,550	2,800	1,650	1,080	1,850	9,900	1,560	6,550
12	430	520	1,650	2,800	7,280	2,300	1,300	1,000	1,650	6,900	5,500	4,200
13	475	520	1,650	2,550	14,200	2,080	1,300	1,000	1,650	4,800	3,900	3,050
14	520	520	1,650	2,080	12,200	1,850	1,150	1,000	1,650	3,900	4,200	2,550
15	790	520	1,480	1,850	9,520	1,850	1,150	1,000	2,080	3,050	2,550	2,080
16	2,300	520	1,220	1,650	8,020	1,850	1,150	1,000	4,500	10,300	2,080	2,080
17	2,080	520	850	3,600	6,200	1,850	1,150	1,000	3,050	10,600	1,850	1,850
18	1,750	520	850	3,600	4,800	1,850	1,000	1,000	2,300	8,400	1,850	1,850
19	1,390	520	925	3,600	4,200	1,850	1,000	1,000	2,550	10,600	1,850	3,300
20	1,080	520	1,000	2,550	3,600	1,650	1,000	1,000	5,500	10,300	2,080	3,600
21	850	520	1,000	2,080	3,050	1,480	1,000	1,480	3,300	10,300	10,300	2,550
22	850	520	730	1,850	2,800	1,480	1,000	1,650	2,550	11,000	9,150	2,300
23	850	520	730	1,850	2,800	1,300	1,300	1,480	2,300	6,900	8,400	2,080
24	850	520	730	1,650	2,800	1,150	1,150	1,300	2,080	4,800	6,900	1,850
25	850	520	.....	1,480	2,800	1,150	1,650	1,300	1,850	3,600	5,850	1,650
26	850	520	.....	1,300	2,550	1,000	2,550	1,390	1,650	3,600	5,150	1,650
27	730	520	.....	1,300	2,300	1,000	1,850	1,480	1,390	3,050	3,900	4,800
28	730	520	.....	1,300	2,080	1,000	1,480	1,560	1,300	2,550	3,050	8,400
29	730	520	.....	1,300	.....	1,000	1,300	6,200	1,300	3,600	2,800	6,200
30	620	520	2,080	1,300	.....	1,000	1,300	11,800	1,300	2,300	2,550	4,200
31	620	.....	1,650	1,300	.....	1,000	.....	7,650	.....	2,080	2,550	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Miami River at Hamilton, Ohio, for the year ending Sept. 30, 1915.

[Drainage area, 3,580 square miles.]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
October	2,300	430	777	B.
November	620	520	527	B.
December	2,080	520	1,220	B.
January	9,520	1,150	2,550	B.
February	31,200	2,080	10,700	B.
March	4,500	1,000	1,970	A.
April	2,550	1,000	1,210	A.
May	11,800	1,000	1,910	A.
June	8,400	1,300	2,810	A.
July	28,900	1,150	7,140	A.
August	10,300	1,560	3,600	A.
September	14,600	1,650	4,190	A.
The year	31,200	430	3,170	

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, 1915.

GAGE.—Vertical staff in two sections; read daily, in the morning, to tenths, 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 the discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded January 1, 1914, to September 30, 1915, 9.55 feet July 8, 1915 (discharge, 10,600 second-feet); minimum stage, 0.2 foot, October 4, 1914 (discharge, 14 second-feet).

The flood of March-April, 1913, reached a stage of 28 feet on March 25.

WINTER FLOW.—Discharge relation affected by ice during severe weather.

ACCURACY.—Results considered 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, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	H. R. Daubenspeck	1.65	198	May 12	B. H. Petty	1.1	114
Nov. 27	do	.85	*a* 54	July 8	E. W. Lane	9.55	10,600
Feb. 9	B. H. Petty	3.2	1,280	16	W. D. Pye and R. Hahs	5.02	3,140
Mar. 9	H. R. Daubenspeck	2.15	500	Sept. 16	B. H. Petty	1.9	335
Apr. 9	do	1.2	100				

a Made by wading; all others made from upstream side of highway bridge 300 feet below gage.

Daily discharge, in second-feet, of Stillwater River near West Milton, Ohio, for the years ending Sept. 30, 1914–15.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914.									
1	39	1,310	254	2,010	218	76	48	48	378
2	48	780	292	4,350	218	333	76	32	292
3	61	845	378	2,840	160	94	61	26	333
4	61	1,310	715	1,700	160	76	61	39	218
5	76	780	980	910	187	114	39	26	187
6	76	478	1,900	845	378	94	32	21	187
7	61	590	4,810	845	333	94	39	26	94
8	61	378	3,100	7,840	333	136	32	48	76
9	114	378	1,400	4,200	254	114	26	61	61
10	160	378	1,310	1,900	292	94	26	160	76
11	218	292	1,220	1,700	292	76	32	254	61
12	292	292	1,140	1,140	254	94	21	292	61
13	254	292	1,220	980	218	76	17	187	76
14	254	292	1,600	845	218	61	160	114	48
15	218	378	2,710	650	187	39	187	94	32
16	187	292	2,230	533	218	76	292	76	39
17	94	114	1,700	426	187	48	218	48	39
18	114	94	1,220	426	187	39	160	39	26
19	187	187	980	378	160	32	76	32	26
20	94	426	590	333	160	32	61	32	32
21	94	533	590	292	136	26	61	26	26
22	114	533	426	218	136	26	39	21	26
23	136	478	378	218	136	48	48	39	32
24	160	426	378	187	114	61	32	26	32
25	333	378	292	187	94	61	32	187	39
26	333	333	292	254	114	76	21	218	26
27	254	292	333	218	94	94	17	136	21
28	254	218	4,500	426	76	94	61	76	21
29	218	.....	3,100	292	76	61	76	254	32
30	187	.....	2,120	292	94	76	76	590	26
31	378	.....	2,010	.....	94	.....	61	426	.....

Daily discharge, in second-feet, of Stillwater River near West Milton, Ohio, for the years ending Sept. 30, 1914–15—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	26	39	136	48	1,700	254	114	114	910	187	136	715
2	17	32	76	48	4,350	218	94	114	910	650	136	650
3	17	61	76	39	4,970	218	136	94	1,310	533	292	533
4	14	48	48	32	3,100	187	136	94	980	426	426	478
5	17	39	533	32	1,900	292	114	114	650	650	910	650
6	26	32	715	48	6,650	650	114	94	478	650	378	1,500
7	21	48	533	2,470	4,350	715	94	114	333	378	378	1,800
8	32	61	378	1,700	1,900	715	94	136	533	8,350	333	980
9	39	61	478	845	980	426	76	160	590	8,860	292	533
10	48	76	478	426	910	378	94	114	378	4,350	187	650
11	61	94	333	378	780	378	114	94	292	1,900	114	845
12	39	61	333	333	3,100	333	187	94	254	1,140	378	533
13	39	61	378	292	2,970	292	218	76	187	845	980	426
14	32	39	292	218	1,900	292	160	76	254	533	650	333
15	39	39	254	218	1,310	254	160	94	1,310	980	378	333
16	187	48	187	254	910	333	136	114	980	3,920	378	378
17	378	76	187	715	715	292	114	136	650	3,100	292	333
18	187	48	218	980	533	218	94	114	533	1,900	292	218
19	218	48	292	715	378	218	94	76	715	3,230	136	980
20	160	61	292	650	378	187	114	76	1,140	1,900	114	650
21	114	48	254	590	333	187	76	94	910	1,700	478	378
22	76	39	218	478	333	160	114	136	650	1,400	2,840	292
23	61	26	218	478	254	187	136	160	378	910	2,350	254
24	61	26	254	533	292	187	254	114	292	533	1,700	254
25	76	32	254	590	292	160	590	94	187	478	1,060	160
26	48	39	218	378	333	160	292	76	218	378	533	114
27	39	48	187	333	333	136	254	76	187	333	378	378
28	61	39	160	292	292	136	160	94	114	254	378	2,470
29	48	48	218	292	.....	114	136	94	114	218	333	1,400
30	61	61	254	218	.....	94	114	1,310	218	187	292	1,310
31	48	.....	254	292	.....	94	.....	1,700	.....	187	218	.....

NOTE.—Discharge determined from a rating curve fairly well defined above 32 second-feet. Open-water rating curve applied throughout the period.

Monthly discharge of Stillwater River near West Milton, Ohio, for the years ending Sept. 30, 1914 and 1915.

[Drainage area, 600 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914.						
January	378	39	165	0.275	0.32	C.
February	1,310	94	467	.778	.81	C.
March	4,810	254	1,420	2.37	2.73	B.
April	7,840	187	1,250	2.08	2.32	B.
May	378	76	186	.310	.36	B.
June	333	26	80.7	.134	.15	B.
July	292	17	70.6	.118	.14	B.
August	590	21	118	.197	.23	B.
September	378	21	87.4	.146	.16	B.
1914–15.						
October	378	14	73.9	0.123	0.14	B.
November	94	26	49.3	.082	.09	B.
December	715	48	281	.468	.54	C.
January	2,470	32	481	.802	.92	C.
February	6,650	254	1,650	2.75	2.86	B.
March	715	94	273	.455	.52	B.
April	590	76	153	.255	.28	B.
May	1,700	76	195	.325	.37	B.
June	1,310	114	555	.925	1.03	B.
July	8,860	187	1,650	2.75	3.17	B.
August	2,840	114	572	.953	1.10	B.
September	2,470	114	684	1.14	1.27	B.
The year	8,860	14	544	.907	12.29	

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, 1915.

GAGE.—Vertical staff in two sections; lower section attached to north wall of rock-lined overflow channel from millrace; upper section attached to south side of old mill building; read daily, in the morning, to tenths, 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 STAGE.—1914–15: Maximum stage recorded, 7.3 feet March 28, 1914 (discharge, 4,040 second-feet); minimum stage recorded, 0.9 foot August 20, 1914 (discharge, 157 second-feet).

The flood of March–April, 1913, reached a stage on March 25 represented by 19.2 feet, referred to gage datum.

WINTER FLOW.—Discharge relation is affected by ice during extremely cold weather.

ACCURACY.—Results considered good.

COOPERATION.—Gage-heignt 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, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	H. R. Daubenspeck....	2.45	[a] 440	Mar. 8	H. R. Daubenspeck....	2.6	[a] 534
Dec. 2	.....do.....	1.3	[b] 203	Apr. 21	B. H. Petty.....	1.7	[a] 244
2	.....do.....	1.25	[b] 204	May 18	.....do.....	1.42	[b] 232
Jan. 7	.....do.....	[c] 4.8	[a] 1,730	July 30	.....do.....	2.25	[a] 338
7	.....do.....	4.0	[a] 1,290	Sept. 9	.....do.....	2.10	[a] 341

[a] Made from downstream side of highway bridge.
[b] Made by wading.
[c] Stage fell 0.4 foot during measurement.

Daily discharge, in second-feet, of Mad River near Springfield, Ohio, for the years ending Sept. 30, 1914 and 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914.								
1	1,150	570	900	415	260	230	189	189
2	675	415	2,870	415	277	230	189	189
3	485	570	1,500	415	260	230	189	189
4	448	386	1,020	415	296	230	189	189
5	415	485	900	415	277	230	189	178
6	386	900	730	415	277	230	189	178
7	3,140	1,500	900	448	260	230	167	178
8	620	730	3,320	415	260	230	167	178
9	386	525	1,360	570	245	230	167	178
10	386	485	1,020	448	245	230	167	178
11	386	840	900	415	245	230	167	178
12	386	525	1,220	415	230	230	167	178
13	386	620	900	415	230	230	167	178
14	386	1,020	730	415	230	230	167	178
15	386	1,500	730	415	230	277	167	178
16	386	1,430	675	415	230	215	167	178
17	386	1,020	570	415	230	215	167	178
18	386	960	570	415	215	215	167	178
19	1,290	570	525	415	230	215	167	178
20	620	485	485	415	230	215	157	178
21	386	485	485	315	230	202	215	178
22	386	415	448	315	230	202	167	178
23	386	448	415	315	230	202	215	202
24	386	448	415	296	260	189	215	189
25	386	415	525	277	245	189	189	189
26	386	415	485	277	230	189	178	178
27	386	386	448	277	230	189	178	178
28	386	4,040	415	277	230	189	167	178
29	.....	1,360	415	277	245	189	189	178
30	.....	1,430	415	277	230	189	202	178
31	.....	840	.....	277	.....	189	189	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	178	202	202	245	1,790	315	277	260	296	336	336	296
2	178	202	202	245	3,770	315	277	260	296	336	336	296
3	178	189	202	245	2,020	296	277	260	315	277	386	296
4	167	189	245	245	1,150	296	277	260	296	277	360	296
5	167	189	277	245	1,020	315	277	260	277	277	315	336
6	167	202	386	245	3,770	840	277	260	245	277	315	960
7	167	202	360	2,100	1,290	620	277	260	230	277	315	485
8	189	202	315	675	840	485	277	260	245	3,950	315	386
9	202	202	315	485	675	415	277	260	245	1,290	315	386
10	189	202	277	315	570	386	277	260	245	730	415	1,500
11	202	189	277	315	570	360	360	260	245	620	336	386
12	215	189	277	277	2,180	336	277	260	245	620	386	386
13	189	189	245	277	2,020	315	277	260	245	620	386	386
14	189	189	245	260	1,290	296	277	245	245	620	336	360
15	315	202	245	260	1,020	277	277	245	315	1,290	336	360
16	675	202	245	277	785	277	277	245	386	2,520	336	360
17	386	202	245	525	675	296	277	215	230	1,430	315	296
18	260	202	245	415	570	296	277	215	245	675	570	315
19	245	202	245	336	570	296	277	215	900	2,260	296	620
20	245	202	245	315	525	296	245	230	415	960	296	386
21	230	189	245	315	448	296	245	215	296	2,960	336	336
22	215	189	245	315	386	296	245	215	296	785	730	336
23	215	189	245	315	415	296	245	215	277	675	360	336
24	202	189	245	315	415	277	245	215	277	620	360	336
25	215	202	245	277	415	277	260	215	277	570	360	315
26	215	202	245	277	415	277	260	230	277	525	336	315
27	202	202	245	277	315	277	260	230	277	485	315	570
28	202	202	245	277	315	277	260	230	277	415	315	415
29	202	202	245	277	.....	277	260	296	277	360	315	386
30	202	202	245	277	.....	277	260	360	415	386	315	386
31	202	.....	245	260	.....	277	.....	296	.....	336	315	.....

NOTE.—Discharge determined from a rating curve fairly well defined from 157 to 4,040 second-feet.

Monthly discharge of Mad River near Springfield, Ohio, for the years ending Sept. 30, 1914 and 1915.

[Drainage area, 488 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914.						
February	3,140	386	578	1.18	1.23	B.
March	4,040	386	846	1.73	1.99	B.
April	3,320	415	876	1.80	2.01	B.
May	570	277	377	.773	.89	B.
June	296	215	244	.500	.56	B.
July	277	189	216	.443	.51	B.
August	215	157	180	.369	.43	B.
September	202	178	181	.371	.41	B.
1914-15.						
October	675	167	226	.463	.53	B.
November	202	189	197	.404	.45	B.
December	386	202	258	.529	.61	C.
January	2,100	245	370	.758	.87	B.
February	3,770	315	1,080	2.21	2.30	B.
March	840	277	337	.691	.80	B.
April	360	245	271	.555	.62	B.
May	360	215	249	.510	.59	B.
June	900	230	304	.623	.70	B.
July	3,950	277	895	1.83	2.11	B.
August	730	296	357	.732	.84	B.
September	1,500	296	427	.875	.98	B.
The year	3,950	167	410	.840	11.40	

MAD RIVER NEAR DAYTON, OHIO.

LOCATION.—In the SE. ¼ sec. 8, T. 3 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, 1915.

GAGE.—Vertical staff, attached to the downstream side of west abutment of bridge; read once daily, to tenths, by John Morris. Sea-level elevation of zero of gage, 783.91feet.

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 bowlders and gravel; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet February 2 (discharge 4,810 second-feet); minimum stage 1.0 foot November 22-30, December 2, 4, and 25-28 (discharge, 165 second-feet).

WINTER FLOW.—Discharge relation seldom affected by ice, as velocities are high.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record reliable. Results considered 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, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 4	H. R. Daubenspeck	1.15	[a] 289	Apr. 10	H. R. Daubenspeck	1.35	[a] 330
Jan. 7	B. H. Petty	4.92	[a] 2,740	May 15	B. H. Petty	1.18	[b] 247
Feb. 2	E. W. Lane	7.06	[a] 4,840	July 31	do	1.60	[a] 474
11	B. H. Petty	2.4	[a] 974	Sept. 11	do	2.30	[a] 824

[a] Made from downstream side of highway bridge at gage. [b] Made by wading.

Daily discharge, in second-feet, of Mad River near Dayton, Ohio, for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	210	410	1,500	520	260	260	410	465	410	310
2	.....	165	310	4,810	520	260	210	575	1,300	410	310
3	.....	210	310	3,650	520	260	210	575	575	410	310
4	.....	165	260	1,910	465	260	210	465	465	410	260
5	.....	740	260	1,500	520	260	210	410	740	360	410
6	.....	685	260	4,590	1,170	260	210	360	575	360	1,980
7	.....	575	3,260	2,220	980	260	310	410	410	360	920
8	.....	520	1,100	1,300	980	260	260	410	4,700	360	740
9	.....	520	740	1,100	740	260	260	410	3,750	630	630
10	.....	465	520	980	685	260	260	310	1,300	465	2,220
11	.....	465	520	920	630	465	260	310	980	410	920
12	.....	410	520	2,380	630	410	260	260	860	740	630
13	.....	360	465	2,900	575	410	260	260	685	630	520
14	.....	360	410	1,770	520	360	210	260	630	465	520
15	.....	360	410	1,430	520	360	210	310	1,430	410	410
16	.....	360	410	1,100	520	360	260	740	2,720	360	360
17	.....	210	980	1,100	410	310	260	465	1,770	360	360
18	.....	210	740	860	360	310	260	360	980	360	310
19	210	310	630	800	410	310	260	920	2,380	360	630
20	210	210	575	740	410	260	310	685	1,240	360	520
21	210	210	410	740	410	260	360	520	2,900	575	410
22	165	210	410	685	360	260	410	465	1,360	1,170	360
23	165	210	410	685	360	310	310	360	920	685	360
24	165	210	410	685	360	260	260	310	740	630	360
25	165	165	410	685	360	260	260	310	630	575	360
26	165	165	410	685	360	260	260	260	575	465	310
27	165	165	410	740	360	260	310	260	575	410	465
28	165	165	360	575	360	260	310	260	520	360	980
29	165	210	360	.....	310	260	260	210	410	360	630
30	165	920	360	.....	310	260	685	1,170	520	360	465
31	.....	465	360	.....	310	.....	465	.....	410	310	.....

NOTE.—Discharge determined from a fairly well-defined rating curve. Open-water rating used throughout the year.

Monthly discharge of Mad River near Dayton, Ohio, for the year ending Sept. 30, 1915.

[Drainage area, 652 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 19–30	210	165	176	0.270	0.12	B.
December	920	165	342	.525	.61	C.
January	3,260	260	561	.860	.99	C.
February	4,810	575	1,540	2.36	2.46	B.
March	1,170	310	514	.788	.91	A.
April	465	260	294	.451	.50	A.
May	685	210	285	.437	.50	A.
June	1,170	210	434	.666	.74	A.
July	4,700	410	1,210	1.86	2.14	A.
August	1,170	310	469	.719	.83	A.
September	2,220	260	599	.919	1.03	A.

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, 1915.

GAGE.—Vertical staff in two sections; read daily, in the morning, to tenths, 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, 4.8 feet, July 8, 1915 (discharge, 1,350 second-feet); minimum stage, 0.6 foot September 9–12, 1914 (discharge, 27 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 12.3 feet, referred to gage datum.

WINTER FLOW.—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.—Results are considered fair. Rating curve fairly well defined but gage is read only once a day.

COOPERATION.—Station maintained and records furnished by the Miami Conservancy District.

Discharge measurements of Buck Creek at Springfield, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	H. R. Daubenspeck	[a] 1.7	[b] 173	Apr. 21	B. H. Petty	1.08	[c] 56
Dec. 2	do	.9	[c] 60	May 18	do	.98	[c] 59
2	do	.9	[c] 53	July 30	do	1.25	[c] 100
Jan. 7	do	2.3	[b] 253	Sept. 9	do	1.20	[d] 84
Mar. 8	do	1.65	[b] 154				

[a] Stage rose 0.4 foot during measurement.
[b] Made from downstream side of Plum Street Bridge.
[c] Made by wading.
[d] Made from downstream side of Ohio Electric Ry. bridge, 1 mile below gage.

Daily discharge, in second-feet, of Buck Creek at Springfield, Ohio, for the years ending Sept. 30, 1914–15.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1914.											
1	.....	53	64	11	.....	34	27	21	64	88	34
2	.....	43	64	12	.....	53	27	22	64	34	34
3	.....	43	53	13	.....	53	64	23	53	34	64
4	.....	43	53	14	58	43	64	24	43	88	53
5	.....	43	43	15	102	43	64	25	53	64	53
6	.....	34	64	16	64	34	53	26	43	88	53
7	.....	34	43	17	53	34	53	27	43	64	53
8	.....	34	34	18	64	34	43	28	43	43	53
9	.....	43	27	19	64	34	43	29	43	102	53
10	.....	43	27	20	64	34	34	30	43	88	43
								31	53	75	.....

Daily discharge, in second-feet of Buck Creek at Springfield, Ohio, for the years ending Sept. 30, 1914–15—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	43	53	64	75	243	116	75	75	88	102	75	64
2	34	64	64	75	1,300	116	64	75	116	64	88	64
3	34	64	53	53	328	102	64	75	102	64	102	53
4	34	64	75	53	303	102	64	75	88	64	75	64
5	34	64	146	43	328	116	64	75	64	146	75	450
6	34	53	131	328	303	131	53	64	64	102	75	303
7	34	53	102	328	281	131	53	64	64	75	75	261
8	43	102	102	162	210	162	53	64	88	1,350	75	210
9	43	88	102	116	146	131	43	64	75	210	131	162
10	64	64	88	116	131	116	43	64	75	194	102	146
11	43	53	88	102	178	116	64	43	64	210	226	131
12	43	53	88	88	386	116	64	43	64	226	386	102
13	43	53	64	75	303	116	64	43	64	178	303	88
14	53	75	53	75	243	102	64	34	53	162	303	88
15	88	64	53	88	178	102	64	88	146	605	210	88
16	178	64	43	88	131	102	53	88	102	210	102	88
17	88	88	43	88	116	88	64	64	75	178	75	75
18	75	53	43	102	116	102	53	64	75	116	64	75
19	64	43	43	102	131	102	53	64	146	303	64	131
20	64	43	43	88	131	102	64	102	116	88	53	75
21	53	43	64	88	116	102	64	131	75	303	162	75
22	43	43	43	102	116	88	75	88	53	88	194	75
23	43	64	43	88	146	88	88	64	64	116	131	75
24	43	64	43	75	116	75	75	64	64	102	102	64
25	43	43	43	88	131	75	75	75	53	102	88	64
26	43	43	43	75	116	88	75	75	43	102	75	64
27	53	43	43	64	116	75	75	75	53	102	75	210
28	64	43	75	64	116	75	75	64	53	88	75	131
29	64	43	102	53	.....	75	75	102	53	102	53	116
30	53	43	88	64	.....	75	75	88	178	88	75	102
31	53	.....	88	102	.....	75	.....	88	.....	88	75	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 27 and 1,470 second-feet.

Monthly discharge of Buck Creek at Springfield, Ohio, for the years ending Sept. 30, 1914 and 1915.

[Drainage area, 163 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914.						
July 14–31	102	43	56.3	0.345	0.23	B.
August	102	34	50.9	.312	.36	B.
September	64	27	47.9	.294	.33	B.
1914–15.						
October	178	34	54.5	.334	.39	B.
November	102	43	57.7	.354	.40	B.
December	146	43	69.8	.428	.49	B.
January	328	43	100	.613	.70	B.
February	1,300	116	231	1.42	1.48	B.
March	162	75	102	.626	.72	B.
April	88	43	64.5	.396	.44	B.
May	131	34	72.3	.444	.51	B.
June	178	43	80.6	.494	.55	B.
July	1,350	64	191	1.17	1.35	B.
August	386	53	121	.742	.86	B.
September	450	53	123	.755	.84	C.
The year	1,350	34	105	.644	8.73	

NOTE.—Accuracy for September, 1915, reduced because of discrepancy between readings by gage observer and hydrographer Sept. 9.

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, 1915.

GAGE.—Vertical staff in two sections; read daily, in the morning, to tenths, by Thomas Stettler. Sea-level elevation of zero of gage, 712.73.

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 DISCHARGE.—Maximum stage recorded during year, 10.9 feet July 8 (discharge, 8,370 second-feet).[1] Minimum stage, 1 foot October 1–10 and 14 (discharge, 17 second-feet). 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.

WINTER FLOW.—Discharge relation affected by ice and occasionally by ice jams.

ACCURACY.—Records good. Discharge measurements made during 1915 and 1916 seem to indicate that the records published for 1914 were too low on the following days: April 12–17, 12 per cent; August 10, 30 per cent; August 15, 7 per cent; August 29, 22 per cent.

COOPERATION.—Station maintained and records furnished by the Miami conservancy district.

Discharge measurements of Twin Creek near Germantown, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	H. R. Daubenspeck....	1.4	[a] 43	May 19	B. H. Petty.....	1.45	[a] 48
Dec. 3	.....do.....	1.05	[a] 26	July 8	.....do.....	[c] 8.28	[b] 4,880
Feb. 16	B. H. Petty.....	2.6	[b] 359	9	.....do.....	4.7	[b] 1,600
Mar. 6	H. R. Daubenspeck....	3.05	[b] 597	Aug. 3	.....do.....	1.75	[a] 78
Apr. 5	.....do.....	1.52	[b] 65	Sept. 17	.....do.....	1.75	[a] 1104

[a] Measurements made by wading.
[b] Measurement made from downstream side of highway bridge at gage.
[c] Stage fell from 9.1 feet to 7.45 feet during measurement, which lasted 3.5 hours.

[1] The maximum discharge for 1914 as published in W. S. Paper 383 is in error, the correct value is 1,670 second-feet.

Daily discharge, in second-feet, of Twin Creek near Germantown, Ohio, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	17	28	28	120	2,700	100	67	44	710	320	82	82
2	17	28	28	120	5,520	100	67	44	820	320	82	67
3	17	28	28	67	2,700	100	67	44	600	280	100	67
4	17	28	28	67	1,450	100	55	44	710	175	120	67
5	17	28	1,120	67	1,250	100	55	44	280	500	100	67
6	17	22	550	120	5,520	550	55	44	205	240	82	1,670
7	17	22	405	2,160	1,180	405	55	44	175	145	82	765
8	17	22	280	765	710	320	55	100	205	8,370	67	600
9	17	44	320	405	500	240	55	67	175	2,340	205	360
10	17	35	280	240	360	205	55	55	145	4,030	82	1,830
11	28	35	240	205	320	175	100	44	120	600	67	550
12	22	35	175	175	1,000	145	175	44	100	405	1,250	320
13	22	28	145	145	1,000	145	120	44	82	320	550	240
14	17	28	145	120	710	120	100	44	82	240	280	145
15	22	28	120	120	550	120	82	44	655	205	240	120
16	100	28	67	100	360	120	82	44	1,000	360	205	100
17	240	28	55	710	280	100	67	100	405	320	175	82
18	145	28	55	550	240	100	67	67	240	550	145	82
19	100	28	67	320	205	100	67	55	450	500	100	280
20	82	22	67	240	175	120	55	55	450	655	82	120
21	67	22	67	175	175	120	55	240	320	820	1,520	100
22	55	22	44	145	145	120	55	205	240	360	1,750	82
23	44	22	55	120	175	120	205	145	145	240	820	67
24	44	22	55	100	175	100	100	100	100	175	450	67
25	35	22	44	175	175	100	100	82	100	145	320	55
26	35	22	28	100	145	100	82	82	82	120	240	55
27	35	22	35	100	120	100	67	240	82	100	175	600
28	35	22	44	120	120	82	67	145	67	82	145	710
29	28	22	44	100	.....	82	55	2,520	100	360	120	360
30	28	28	320	100	.....	82	55	4,470	1,180	100	100	205
31	28	.....	175	120	.....	82	.....	1,320	.....	82	82	.....

NOTE.—Discharge determined from a fairly well defined rating curve. Open-water rating curve applied throughout the year.

Monthly discharge of Twin Creek near Germantown, Ohio, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	240	17	44.6	0.164	0.19	B.
November	44	22	26.6	.098	.11	B.
December	1,120	28	165	.607	.70	C.
January	2,160	67	264	.971	1.12	C.
February	5,520	120	999	3.67	3.82	B.
March	550	82	147	.540	.62	B.
April	205	55	78.1	.287	.32	B.
May	4,470	44	343	1.26	1.45	B.
June	1,180	67	334	1.23	1.37	B.
July	8,370	82	757	2.78	3.20	B.
August	1,750	67	317	1.17	1.35	B.
September	1,830	55	330	1.21	1.35	B.
The year	8,370	17	313	1.15	15.60	

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, 1915.

GAGE.—Vertical staff in two sections; read daily, in the morning, to tenths, 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, 4.9 feet July 8; minimum stage, 1.1 feet November 26–29 and May 6.

Maximum stage recorded, 18 feet March 25, 1913.

WINTER FLOW.—Gage heights may be affected by ice jams at times.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record reliable.

COOPERATION.—Gage-height record and results of discharge measurements furnished by the Miami Conservancy District.

The computation of daily discharge has been postponed pending further high-water measurements.

Discharge measurements of Fourmile Creek near Sevenmile, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 25	H. R. Daubenspeck....	1.3	2.9	Apr. 23	B. H. Petty.....	2.25	179
Jan. 18	.....do.....	2.0	130	May 20	.....do.....	1.72	59
Feb. 6	I. E. Houk.....	3.3	947	Sept. 22	.....do.....	1.70	51

Daily gage height, in feet, of Fourmile Creek near Sevenmile, Ohio, for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.2	2.0	4.5	2.0	1.7	1.5	2.3	1.6	2.4	1.7
2	.....	1.2	2.0	4.8	2.0	1.7	1.5	2.1	1.6	1.9	1.6
3	.....	1.2	2.0	4.4	2.0	1.7	1.5	2.0	1.7	1.9	1.6
4	.....	1.5	2.0	2.9	2.0	1.7	1.3	1.8	1.7	1.8	1.5
5	.....	2.0	2.0	4.3	2.7	1.7	1.2	1.7	1.8	1.7	3.2
6	.....	1.9	2.4	3.6	3.0	1.7	1.1	1.6	1.6	1.7	4.5
7	.....	1.7	2.7	3.8	2.9	1.7	1.9	1.9	1.6	1.9	4.0
8	.....	1.7	2.4	3.3	2.3	1.7	1.6	1.9	4.9	2.0	3.7
9	.....	1.9	2.4	3.2	2.0	1.7	1.6	1.9	4.3	2.9	3.1
10	.....	1.7	2.2	2.9	1.9	1.9	1.5	1.8	4.0	2.7	2.6
11	.....	1.6	2.0	2.5	1.8	1.9	1.5	1.8	3.7	2.7	2.1
12	.....	1.6	2.0	2.6	1.7	1.8	1.5	1.8	3.4	3.6	2.0
13	.....	1.6	1.9	2.6	1.7	1.7	1.5	1.8	3.0	3.4	1.9
14	.....	1.6	1.9	2.7	1.7	1.7	1.5	2.0	2.8	3.0	1.9
15	.....	1.6	1.9	2.7	1.7	1.6	1.5	2.4	2.3	3.3	1.9
16	.....	1.6	1.8	2.3	1.7	1.6	1.6	2.3	2.0	3.1	1.9
17	1.2	1.6	1.8	2.2	1.7	1.6	1.6	2.1	1.9	3.1	1.9
18	1.2	1.6	1.8	2.1	1.7	1.6	1.6	1.9	1.9	2.9	1.9
19	1.2	1.6	1.8	1.9	1.9	1.6	1.5	2.2	2.0	2.9	1.8
20	1.3	1.6	1.5	1.7	2.0	1.6	2.0	1.9	2.0	3.0	1.8
21	1.3	1.6	1.5	1.7	2.0	1.6	1.8	1.7	2.6	3.8	1.8
22	1.3	1.6	1.4	1.7	1.9	1.9	1.8	1.7	2.1	4.2	1.7
23	1.3	1.6	1.4	2.0	1.9	2.3	1.8	1.6	2.0	3.9	1.7
24	1.3	1.6	1.5	2.0	1.8	1.9	1.7	1.6	2.0	3.7	1.7
25	1.2	1.6	1.5	2.0	1.7	1.8	1.6	1.5	1.9	3.6	1.7
26	1.1	1.6	1.5	2.0	1.7	1.7	1.7	1.4	1.9	3.4	1.6
27	1.1	1.6	1.5	2.0	1.8	1.6	1.9	1.4	1.8	2.9	2.6
28	1.1	1.6	1.6	2.0	1.7	1.6	2.0	1.3	1.8	2.6	2.4
29	1.1	1.7	1.6	.....	1.7	1.6	3.2	1.5	2.7	2.3	2.8
30	1.2	2.0	1.6	.....	1.7	1.6	3.0	1.5	2.4	2.0	2.7
31	.....	2.0	3.4	.....	1.7	.....	2.5	.....	2.0	1.9	.....

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 7, 1914, to September 30, 1915.

GAGE.—Vertical staff on downstrean side of west abutment; read daily, in the morning, to tenths, 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, 9 feet July 8; minimum stage, 1.3 feet November 25–29.

Maximum stage recorded, 17 feet March 25, 1913.

WINTER FLOW.—Stream is seldom covered with ice on account of the high velocities, but discharge relation is sometimes affected by ice jams.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record is reliable.

COOPERATION.—Gage-height record and results of discharge measurements furnished by the Miami Conservancy District.

Computation of daily discharge postponed pending further high-water measurements.

Discharge measurements of Sevenmile Creek at Sevenmile, Ohio, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 25	H. R. Daubenspeck	1.3	4.4	Apr. 23	B. H. Petty	2.38	133
Jan. 18	do	2.4	173	May 20	do	1.92	42
Feb. 6	I. E. Houk	4.6	1,160	Sept. 22	do	2.10	62

Daily gage height, in feet, of Sevenmile Creek at Sevenmile, Ohio, for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.4	2.6	5.6	2.0	2.0	1.7	2.9	2.0	2.5	2.2
2	.....	1.4	2.3	6.4	2.0	1.9	1.7	3.0	2.3	4.0	2.1
3	.....	1.4	2.5	4.4	2.0	1.9	1.7	2.6	2.2	2.5	2.1
4	.....	1.5	2.2	3.6	2.0	1.9	1.7	2.5	2.2	2.5	2.1
5	.....	2.0	2.0	4.8	2.5	1.9	1.7	2.2	2.6	2.2	3.5
6	.....	2.0	2.0	5.6	2.8	1.9	1.7	2.2	2.4	2.2	4.0
7	.....	1.9	3.5	3.6	2.5	1.8	1.7	2.2	2.2	2.1	3.5
8	.....	1.9	2.5	3.2	2.4	1.8	2.1	2.3	9.0	3.5	3.0
9	.....	1.9	2.1	2.8	2.3	1.9	1.9	2.1	3.6	2.8	2.8
10	.....	1.8	2.0	2.6	2.3	1.8	1.8	2.1	3.1	2.5	3.4
11	.....	1.8	2.0	2.6	2.2	2.1	1.7	2.1	3.1	2.2	2.8
12	.....	1.8	2.0	3.4	2.2	2.1	1.7	2.1	2.6	3.5	2.5
13	.....	1.8	2.0	3.3	2.1	2.0	1.7	2.1	2.6	2.7	2.5
14	.....	1.6	1.9	3.0	2.1	1.9	1.7	2.0	2.4	2.4	2.3
15	.....	1.8	1.9	2.8	2.1	1.9	1.7	2.3	2.3	2.8	2.2
16	.....	2.1	1.8	2.6	2.1	1.9	1.9	2.3	2.2	2.4	2.2
17	1.4	2.1	2.8	2.5	2.0	1.9	1.8	2.2	2.9	2.3	2.1
18	1.4	2.1	2.4	2.4	2.0	1.9	1.7	2.1	2.5	2.5	2.1
19	1.4	2.1	2.1	2.3	2.1	1.8	1.7	2.5	3.6	2.2	2.5
20	1.4	2.0	2.0	2.3	2.1	1.8	1.7	2.3	2.4	2.2	2.3
21	1.5	1.8	2.0	2.3	2.2	1.8	2.5	2.2	2.6	3.0	2.2
22	1.4	1.9	2.0	2.3	2.2	1.9	2.3	2.2	2.2	4.0	2.1
23	1.5	1.8	2.0	2.2	2.2	2.5	2.3	2.1	2.1	3.2	2.0
24	1.4	1.8	2.0	2.3	2.1	2.3	2.1	2.0	2.0	2.8	1.9
25	1.3	1.8	2.0	2.2	2.1	2.0	2.0	1.8	2.0	2.9	1.9
26	1.3	1.7	2.1	2.2	2.1	2.0	2.0	1.9	2.0	2.7	2.0
27	1.3	1.8	2.1	2.0	2.0	1.9	2.0	1.8	2.0	2.5	3.3
28	1.3	1.8	2.2	2.0	2.0	1.8	2.0	1.8	1.9	2.3	3.0
29	1.3	2.0	2.2	.....	2.0	1.8	5.0	1.8	2.8	2.3	2.7
30	1.4	3.0	2.6	.....	2.0	1.7	4.2	2.4	2.2	2.3	2.5
31	.....	2.5	2.6	.....	2.0	.....	3.4	.....	2.2	2.3	.....

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. King's mill is one-fourth mile above the station.

DRAINAGE AREA.—395 square miles [1] (86 per cent measured on topographic maps and 14 per cent on map of Kentucky, scale 1:500,000, prepared by U. S. Geological Survey).

RECORDS AVAILABLE.—July 2, 1910, to July 16, 1911; October 1, 1911, to September 30, 1915.

GAGE.—Staff gage attached to right upstream wing wall of bridge near face of abutment; read twice daily, to quarter tenths, by J. E. Sadler beginning January 1, and by C. P. Kennedy previous to that date. 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.

CHANNEL AND CONTROL.—The channel and control are 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 discharge relation to a small extent.

[1] Supersedes area of 416 square miles used in previous reports.

EXTREMES OF STAGE.—Maximum stage recorded during year: 16.1 feet at 7 p. m. July 8; minimum stage, 3.12 feet at 7 p. m. September 30.

Maximum stage about 30 feet, date unknown.

WINTER FLOW.—No ice at the station.

DIVERSIONS.—None.

REGULATION.—None. The dam at Kennedy's mill (now called King's mill) is partly destroyed and mill is not operated.

ACCURACY.—Gage readings considered fair. Discharge measurements made during 1915 and 1916 indicate that the floods of January and March, 1913, changed the discharge relation an unknown amount. Estimates of daily discharge from January 6 to September 30, 1913, as published in Water-Supply Paper 353 are probably in error and should not be used. Revised estimates will be published as soon as additional discharge measurements can be made.

COOPERATION.—Stations maintained in cooperation with Kentucky State Geological Survey, J. B. Hoeing, state geologist.

Discharge measurements of Dix River near Burgin, Ky., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*
Mar. 2	Ellsworth and Sellier	4.02	101
18	C. E. Ellsworth	5.14	341

Daily gage height, in feet, of Dix River near Burgin, Ky., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.2	4.3	4.5	.....	16.8	4.1	4.95	3.48	5.25	6.4	3.62	4.10
2	3.2	4.0	4.6	.....	12.0	4.0	4.95	3.42	5.6	9.0	4.95	4.5
3	3.2	4.0	4.6	.....	8.4	4.0	4.85	3.50	5.2	7.1	6.1	3.92
4	3.2	4.0	8.4	.....	7.4	3.9	4.85	3.45	5.0	7.3	5.45	3.82
5	3.2	4.0	9.6	.....	7.4	4.4	4.8	3.46	4.7	8.7	4.7	4.7
6	3.2	4.0	.....	.....	9.6	8.9	4.75	3.95	3.95	7.9	4.45	6.8
7	3.2	3.9	8.3	.....	7.9	6.8	4.7	3.90	3.85	6.6	4.00	7.5
8	3.2	3.9	7.8	.....	7.0	5.8	4.65	3.80	4.28	12.2	3.80	6.2
9	6.4	3.9	7.6	.....	6.3	5.5	4.65	4.15	4.04	8.9	3.78	5.8
10	10.4	3.9	7.4	.....	5.7	5.0	4.65	4.00	4.35	6.6	4.25	5.35
11	7.5	3.9	6.8	7.7	5.35	4.85	4.65	3.95	4.02	6.8	7.7	5.1
12	6.8	3.9	6.0	13.1	5.2	4.65	5.4	3.92	3.88	6.6	8.8	4.9
13	6.0	3.9	5.8	10.6	5.0	4.5	5.3	3.90	3.72	12.5	6.2	4.75
14	16.4	3.6	5.4	8.5	4.85	4.55	5.1	3.82	3.65	8.1	4.8	4.55
15	17.3	3.5	5.1	6.8	4.8	4.3	5.0	3.68	3.95	6.4	4.42	4.30
16	13.6	3.5	4.9	6.2	5.9	5.3	4.85	3.62	7.9	5.7	6.2	4.01
17	.....	3.5	5.6	6.6	4.95	4.7	4.7	3.62	6.2	5.05	5.6	3.76
18	12.6	3.5	5.7	7.5	4.75	5.0	4.6	3.68	5.1	4.85	6.4	3.55
19	10.7	3.5	5.7	9.4	4.6	5.5	4.6	3.65	4.8	4.55	5.5	3.39
20	9.4	3.5	12.6	8.0	4.4	5.15	4.6	3.60	7.0	4.7	5.2	3.28
21	6.8	3.5	10.8	7.2	4.4	5.5	4.30	3.48	6.9	4.55	6.3	3.40
22	5.9	3.5	8.8	7.1	4.3	5.4	4.20	3.72	7.2	4.35	6.6	3.42
23	5.6	3.5	7.4	10.9	4.2	5.5	4.18	4.75	5.8	4.15	6.4	3.38
24	5.2	3.3	7.3	8.6	4.35	5.8	4.20	5.50	5.35	3.85	6.4	3.40
25	5.0	3.3	10.5	7.4	4.4	6.4	4.20	6.4	5.0	3.65	6.6	3.39
26	5.0	3.3	9.4	6.9	4.4	5.9	4.15	5.2	4.30	3.54	5.6	3.38
27	4.8	3.3	7.4	6.3	4.25	5.7	3.85	10.4	4.10	3.42	4.55	3.34
28	4.6	3.3	.....	5.6	4.2	5.5	3.68	9.3	4.15	3.48	4.37	3.30
29	4.5	3.3	.....	6.0	.....	5.4	3.62	7.4	4.05	3.48	4.32	3.28
30	4.0	4.5	.....	5.4	.....	5.2	3.52	6.6	4.18	3.38	4.36	3.18
31	4.3	.....	.....	6.1	.....	5.15	.....	6.4	.....	3.48	4.20	.....

NOTE.—Gage heights not recorded Oct. 17, Dec. 6, 28–31, and Jan. 1–10.

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 U. S. Geological Survey.

RECORDS AVAILABLE.—February 27 to September 30, 1915.

GAGE.—Chain gage attached to upstream hand rail of bridge; read twice daily, to hundredths, 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 STAGE.—Maximum stage recorded during year, 20.3 feet at 5.25 p. m. May 24; minimum stage 3.06 feet at 5.20 p. m. September 5.

Highest known stage about 54 feet, date unknown.

WINTER FLOW.—No ice at the station.

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Records good.

COOPERATION.—Station maintained in cooperation with the Kentucky Geological Survey, J. B. Hoeing, state geologist.

Discharge measurements of Green River at Munfordville, Ky., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 26	Ellsworth and Sellier	4.02	961
Mar. 15	C. E. Ellsworth	4.07	1,010

Daily gage height, in feet, of Green River at Munfordville, Ky., for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	3.70	4.34	3.23	6.18	5.41	3.23	3.42
2	.....	3.68	4.20	3.23	5.98	6.00	4.20	3.38
3	.....	3.49	3.99	3.27	6.55	5.42	5.86	3.36
4	.....	3.42	3.93	4.25	5.89	4.96	4.14	3.32
5	.....	3.69	3.82	4.45	5.05	6.27	4.08	3.16
6	.....	5.57	3.77	3.70	5.23	6.67	3.85	6.90
7	.....	7.28	3.74	4.63	5.61	6.54	3.60	8.98
8	.....	6.98	3.68	7.24	6.98	5.81	3.43	7.10
9	.....	5.70	3.66	5.82	6.95	5.43	3.33	4.92
10	.....	5.02	3.62	4.56	6.82	4.79	3.27	4.32
11	.....	4.60	3.50	4.20	5.11	8.35	3.27	4.05
12	.....	4.34	4.02	3.84	4.93	9.76	5.35	3.80
13	.....	4.22	4.44	3.68	5.13	10.70	4.16	3.62
14	.....	4.11	4.46	3.60	5.07	11.08	3.73	3.49
15	.....	4.06	4.26	3.44	8.05	10.24	4.57	3.40
16	.....	4.02	3.89	3.33	14.15	7.94	4.03	3.35
17	.....	4.08	3.77	3.30	12.03	5.23	3.98	3.79
18	.....	4.47	3.68	3.24	8.12	7.01	4.16	3.35
19	.....	4.78	3.66	3.15	10.48	4.99	4.61	3.47
20	.....	4.65	3.62	3.24	14.44	4.70	4.47	3.27
21	.....	4.64	3.56	3.22	13.82	4.59	6.93	3.23
22	.....	4.68	3.57	5.02	18.82	4.17	6.19	3.47
23	.....	6.04	3.53	11.43	16.74	4.10	6.19	3.39
24	.....	5.18	3.49	18.69	11.28	3.81	4.99	3.25
25	.....	5.76	3.46	14.71	7.32	3.62	4.37	3.23
26	.....	6.12	3.43	7.68	5.50	3.52	4.01	3.13
27	.....	6.00	3.38	7.98	4.85	3.44	3.78	3.15
28	3.77	5.54	3.35	7.54	4.64	3.38	3.66	3.17
29	.....	5.10	3.28	7.49	5.22	3.35	3.52	3.09
30	.....	4.75	3.28	6.70	6.50	3.28	3.57	3.50
31	.....	.....	.....	7.69	.....	3.26	3.54	.....

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, and 3 miles below mouth of North Fork. Stony Creek enters from the left 1¾ miles below the station.

DRAINAGE AREA.—1,280 square miles.

RECORDS AVAILABLE.—November 12, 1914, to September 30, 1915.

GAGE.—Chain gage attached to downstream side of bridge; read daily, morning and evening, by Cecil Hayes prior to April 30, and by Ralph Bradbury after that date.

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

CHANNEL AND CONTROL.—Bed of channel at gage consists of soft mud.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 15.9 feet at 4 p. m. August 1 (discharge, 9,880 second-feet); minimum stage recorded during open-water periods 2.00 feet, November 20, and 23 to 25 (discharge 15 second-feet).

WINTER FLOW.—Discharge relation may be affected by ice during parts of December, January, and February.

ACCURACY.—Results fair except for periods when discharge relation was affected by ice and during the last part of April and first part of May, when the gage-height record appeared to be unreliable.

Discharge measurements of Vermilion River at Danville, Ill., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 12	William Kessler	2.11	26.3	Aug. 2	William Kessler	14.29	8,620
Dec. 4	B. J. Peterson	2.16	27.0	2	.....do	14.09	8,420
Mar. 17	William Kessler	3.14	285	Sept. 14	.....do	3.53	436
June 16	.....do	3.07	257	14	.....do	3.50	445
Aug. 1	.....do	13.97	8,200				

Daily discharge, in second-feet, of Vermilion River near Danville, Ill., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	24	120	619	149	22	1,160	107	9,790	570
2	.....	24	1,600	524	137	26	2,430	123	8,160	475
3	.....	25	1,600	430	134	31	2,130	126	7,520	408
4	.....	30	1,460	408	134	71	2,060	149	5,280	366
5	.....	34	1,300	387	134	73	1,900	129	4,400	346
6	.....	34	1,180	424	110	93	1,380	112	2,880	346
7	.....	34	1,050	461	85	250	1,040	134	2,200	346
8	.....	34	930	498	83	250	720	1,230	2,060	306
9	.....	40	800	464	90	232	570	771	1,300	306
10	.....	39	669	430	110	222	475	876	1,160	268
11	.....	39	620	398	197	204	430	1,980	1,160	250
12	24	38	570	366	200	190	430	1,100	930	250
13	23	35	554	346	619	184	408	771	876	232
14	22	31	538	326	250	152	366	619	720	214
15	22	30	522	306	197	129	326	594	644	306
16	20	28	454	296	180	123	268	823	546	522
17	20	24	387	287	167	120	228	771	522	669
18	22	20	346	268	161	118	250	669	430	823
19	18	23	306	268	152	120	306	498	452	1,100
20	15	23	287	268	112	126	287	366	1,100	1,530
21	18	24	269	259	107	131	250	250	2,960	2,060
22	16	23	250	250	93	134	177	197	4,400	1,680
23	15	23	1,260	250	306	120	140	177	4,480	1,100
24	15	23	2,280	232	287	110	140	123	3,840	876
25	15	20	1,980	228	287	118	123	171	2,880	669
26	16	20	1,600	214	250	149	107	1,760	2,060	594
27	17	19	1,270	204	268	214	105	771	1,530	619
28	17	19	946	180	250	522	110	570	1,100	619
29	19	21	.....	167	232	985	115	930	1,100	644
30	24	23	.....	167	232	1,100	129	1,830	876	570
31	.....	23	.....	167	.....	1,160	.....	9,540	644	.....

NOTE.—Discharge determined from a fairly well-defined rating curve except as follows: Dec. 25 and 26, estimated because of ice; Feb. 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 23, 27, 28, Mar. 2, 4, 6, 7, 9, 11, 13, 14, 16, and 21, interpolated because gage was not read. Discharge Jan. 1-31 estimated, because of ice, from gage heights, observer's notes, and climatic records, at 30 second-feet. Discharge for the last part of April and first part of May subject to errors because of apparently unreliable gage readings.

Monthly discharge of Vermilion River near Danville, Ill., for the year ending Sept. 30, 1915.

[Drainage area, 1,280 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 12-30	24	15	18.8	0.015	0.01	B.
December	40	19	27.3	.021	.02	C.
January	.....	.....	30	.023	.03	D.
February	2,280	120	898	.702	.73	C.
March	619	167	326	.255	.29	B.
April	619	83	190	.148	.17	C.
May	1,160	22	241	.188	.22	C.
June	2,430	105	619	.484	.54	B.
July	9,540	107	912	.712	.82	B.
August	9,790	430	2,520	1.97	2.27	B.
September	2,060	214	635	.496	.55	B.

EMBARRASS RIVER NEAR OAKLAND, ILL.

LOCATION.—In the northeastern part of T. 14 N., R. 10 E., on the county line road to Hindsboro and Arcola, at highway bridge about 2 miles northwest of Oakland, Coles County, and about 5 miles below the mouth of Brush Creek.

DRAINAGE AREA.—535 square miles.

RECORDS AVAILABLE.—October 23, 1909, to December 31, 1912; August 25, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Chain gage attached to bridge; read daily, in the morning, by S. C. Chapman. Sea-level elevation of the zero of the gage, 595.66 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Measuring section is at a pool and is practically permanent; control, about half a mile downstream, consists of coarse gravel and is probably permanent. Point of zero flow, determined by leveling, August 25, 1914, gage height 1.55 feet ±0.05 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year: 17.65 feet at 6.05 a. m. August 4 (discharge, 4,700 second-feet); no flow past the gage October 1 to 13.

1909–1912 and 1914–15: Maximum stage recorded, 17.65 feet at 6.05 a. m. August 4, 1915 (discharge, 4,700 second-feet). Flood of 1897 reached a stage represented by about 24 feet on present gage (discharge not known). No flow August 25 to 29 and September 12 to October 13, 1914.

WINTER FLOW.—Discharge relation may be affected by ice during parts of December, January, and February.

ACCURACY.—Results fair for extreme low stages and good for medium stages.

Discharge measurements of Embarrass River near Oakland, Ill., during the year ending Sept. 30, 1915.

[Made by William Kessler.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 24	3.78	134	Sept. 15	3.74	122
24	3.77	134	15	3.71	139

Daily discharge, in second-feet, of Embarrass River near Oakland, Ill., for the years ending Sept. 30, 1914 and 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1914.			1914.			1914.		
1		2.0	11		0.3	21		0.3
2		2.0	12		.0	22		.0
3		1.7	13		.0	23		.0
4		1.2	14		.0	24		.0
5		.5	15		.0	25	0.0	.0
6		4.6	16		.0	26	.0	.0
7		5.5	17		.0	27	.0	.0
8		2.4	18		.0	28	.0	.0
9		1.2	19		.0	29	.0	.0
10		.8	20		.0	30	.5	.0
						31	2.0	

Daily discharge, in second-feet, of Embarrass River near Oakland, Ill., for the years ending Sept. 30, 1914 and 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	0.0	1.2	1.7	.....	715	498	76	68	2,300	158	2,340	416
2	.0	1.2	1.7	.....	1,450	376	85	64	2,300	477	2,750	356
3	.0	1.2	1.7	.....	1,480	336	72	140	1,720	477	3,650	297
4	.0	1.2	2.0	.....	1,050	297	76	260	1,510	456	4,680	260
5	.0	.3	2.0	.....	902	260	68	234	1,390	436	4,640	226
6	.0	.3	2.0	.....	1,130	540	68	179	1,160	356	3,740	316
7	.0	.3	2.0	.....	1,050	456	68	278	950	260	2,580	316
8	.0	3.0	2.0	.....	902	456	61	540	806	1,330	1,580	336
9	.0	3.0	2.0	.....	671	376	52	540	583	2,380	1,100	297
10	.0	3.0	4.0	.....	540	356	64	498	477	3,140	783	226
11	.0	3.0	4.0	.....	297	316	76	278	376	2,790	627	186
12	.0	2.0	3.0	.....	297	297	72	234	376	2,420	561	165
13	.0	2.0	.....	.....	297	260	64	202	336	2,190	498	172
14	5.5	2.0	.....	.....	278	243	55	165	278	1,860	416	146
15	10.0	1.2	.....	.....	260	226	49	152	243	1,390	376	122
16	8.5	1.2	.....	.....	226	234	52	140	260	1,050	316	110
17	7.0	1.2	.....	.....	172	202	52	122	226	783	356	116
18	7.0	.....	.....	.....	165	172	52	105	179	806	806	1,050
19	5.5	.....	.....	.....	179	194	49	95	172	693	950	950
20	4.0	.....	.....	.....	146	179	58	105	165	436	737	806
21	3.0	.....	.....	.....	134	152	55	140	179	356	2,500	649
22	3.0	.....	.....	.....	134	140	52	134	243	278	4,040	456
23	3.0	.....	.....	.....	498	134	146	105	297	243	4,600	356
24	3.0	.....	.....	.....	1,160	128	194	95	243	194	4,000	297
25	2.0	.....	.....	.....	1,330	128	134	90	194	179	2,960	260
26	2.0	1.2	.....	.....	1,100	122	105	671	165	561	1,970	202
27	2.0	1.7	.....	.....	760	110	90	1,930	134	926	1,360	226
28	2.0	1.7	.....	.....	693	90	85	2,460	116	926	975	179
29	1.2	1.7	.....	.....	.....	122	80	2,710	110	649	760	172
30	.5	1.7	.....	.....	.....	105	72	2,840	105	1,100	649	152
31	.8	.....	.....	.....	.....	85	.....	2,670	.....	1,750	519	.....

NOTE.—Discharge determined from a rating curve well defined between 20 and 1,500 second-feet. Discharge estimated, because of ice, from gage heights, observer's notes, and climatic records, as follows: Nov. 18–25, 1 second-foot; Dec. 13–31, 2 second-feet; Jan. 1–15, 10 second-feet; Jan. 16–31, 25 second-feet; estimates should be used with caution as they are based on inadequate data.

Monthly discharge of Embarrass River near Oakland, Ill., for the years ending Sept. 30, 1914–15.

[Drainage area, 535 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914.						
September	5.5	0.0	0.74	0.0014	0.002	C.
1914–15.						
October	10	.0	2.26	.0042	.005	C.
November	3.0	.3	1.44	.0027	.003	C.
December	.....	.....	2.13	.0040	.005	D.
January	.....	.....	17.7	.033	.03	D.
February	1,480	134	643	1.20	1.25	B.
March	540	85	245	.458	.53	A.
April	194	49	76.1	.142	.16	A.
May	2,840	64	589	1.10	1.27	B.
June	2,300	105	586	1.10	1.23	B.
July	3,140	158	1,000	1.87	2.16	B.
August	4,680	316	1,870	3.50	4.04	C.
September	1,050	110	327	.611	.68	B.
The year	4,680	.0	447	.836	11.37	

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, at Ste. Marie, Jasper County, about 450 feet downstream from the Cincinnati, Hamilton & Dayton Railway bridge, and 2½ miles upstream from the 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, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning or afternoon, by V. C. Wuerth.

DISCHARGE MEASUREMENTS.—Measurements made from downstream side of highway bridge at ordinary stages; during high water made also from the downstream side of five wooden trestles on the Cincinnati, Hamilton & Dayton Railway, northwest of the highway bridge.

CHANNEL AND CONTROL.—Measuring section is in a pool. Channel shifting; control is about 1,800 feet below gage. Point of zero flood, determined by leveling August 24, 1914, gage height to 1.0 foot ± 0.1 foot.

EXTREMES OF DISCHARGE.—1909–1912 and 1914–1915: Maximum stage recorded during year, 20.0 feet at 7 a. m. and 1 p. m. August 23, 1915 (discharge, 6,500 second-feet); minimum stage recorded during open-water periods, 1.1 foot October 5 to 9 and November 19, 1914 (discharge 1 second-foot).

The flood during the spring of 1908 reached a stage of 22.5 feet (discharge not determined).

WINTER FLOW.—Discharge relation may be affected by ice during parts of December, January, and February.

ACCURACY.—Results not very good; gage readings for certain periods apparently not thoroughly reliable.

Discharge measurements of Embarrass River at Ste. Marie, Ill., during the year ending Sept. 30, 1915.

[Made by William Kessler.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec. ft.*		*Feet.*	*Sec. ft.*
Mar. 25	3.74	336	June 15	8.69	1,540
25	3.73	333	15	8.08	1,320

Daily discharge, in second-feet, of Embarrass River at Ste. Marie, Ill., for the years ending Sept. 30, 1914 and 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1914.			1914.			1914.		
1		90	11		18	21		3.0
2		38	12		12	22		3.0
3		27	13		12	23		3.0
4		22	14		8.5	24	18	3.0
5		14	15		8.5	25	12	3.0
6		12	16		8.5	26	18	3.0
7		22	17		5.5	27	8.5	3.0
8		27	18		5.5	28	147	3.0
9		12	19		5.5	29	73	3.0
10		22	20		5.5	30	22	3.0
						31	223	

Daily discharge, in second-feet, of Embarrass River at Ste. Marie, Ill., for the years ending Sept. 30, 1914 and 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	3.0	5.5	3.0	.....	.....	1,150	242	51	5,400	460	1,560	1,320
2	3.0	5.5	4.2	.....	.....	925	242	50	4,850	261	2,460	1,230
3	3.0	5.5	4.2	.....	.....	800	242	252	3,860	252	3,360	1,050
4	3.0	3.0	5.5	.....	.....	680	242	252	2,900	380	4,300	950
5	1.0	5.5	8.5	.....	.....	775	242	252	2,380	480	4,350	800
6	1.0	5.5	7.0	.....	.....	900	242	242	1,980	680	4,350	580
7	1.0	5.5	5.5	.....	.....	1,080	242	261	1,940	480	4,300	950
8	1.0	8.5	5.5	.....	1,900	875	242	480	1,320	2,020	4,300	800
9	1.0	5.5	5.5	.....	1,320	800	242	460	1,260	3,860	2,780	700
10	14	8.5	3.0	.....	1,120	750	a 242	460	1,050	4,350	1,980	1,260
11	18	8.5	5.5	.....	850	750	242	460	975	4,080	1,980	950
12	300	5.5	5.5	.....	875	660	242	460	950	4,660	2,020	700
13	90	5.5	3.0	.....	775	560	242	261	950	4,800	2,020	680
14	32	3.0	.....	.....	875	560	242	252	1,260	4,850	2,020	480
15	90	5.5	.....	.....	925	500	242	252	1,260	3,810	3,860	460
16	261	5.5	.....	.....	875	480	57	252	800	3,360	3,180	460
17	360	5.5	.....	.....	800	460	57	252	700	2,860	2,020	460
18	280	5.5	.....	.....	725	440	a 56	242	680	1,590	3,360	1,940
19	128	1.0	.....	.....	620	400	a 54	a 242	480	1,320	1,980	2,460
20	58	5.5	.....	.....	560	420	a 54	380	1,260	1,230	3,810	2,060
21	32	5.5	.....	.....	520	380	a 52	1,050	2,420	950	5,400	1,320
22	27	5.5	.....	.....	460	400	50	1,180	1,560	950	5,950	1,230
23	22	4.2	.....	.....	3,270	360	185	680	700	950	6,500	950
24	18	3.0	.....	.....	4,530	360	252	380	480	700	6,450	700
25	14	3.0	.....	.....	3,810	340	185	460	480	700	5,900	680
26	12	4.2	.....	.....	2,620	320	57	1,440	480	700	5,400	580
27	12	4.2	.....	.....	1,650	300	56	5,000	460	680	5,350	480
28	12	4.2	.....	.....	1,290	280	54	5,500	460	950	4,080	480
29	8.5	3.0	.....	.....	.....	261	54	5,900	950	1,230	2,860	460
30	8.5	4.2	.....	.....	.....	252	52	5,900	680	1,560	1,980	460
31	5.5	.....	.....	.....	.....	242	.....	5,900	.....	1,560	1,560	.....

a Estimated because gage reading was erroneous.

NOTE.—Discharge determined from a rating curve fairly well defined between 15 and 2,000 second-feet. Discharge estimated because of ice from gage heights, observer's notes, and climatic records, as follows: Dec. 14–31, 4 second-feet; Jan. 1–15, 20 second-feet; Jan. 16–31, 60 second-feet; and Feb. 1–7, 2,000 second-feet; estimates should be used with caution as they are based on inadequate data.

Monthly discharge of Embarrass River at Ste. Marie, Ill., for the years ending Sept. 30, 1914 and 1915.

[Drainage area, 1,540 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914.						
September	90	3.0	13.5	0.0088	0.01	D.
1914–15.						
October	360	1.0	58.7	.038	.04	D.
November	8.5	1.0	5.02	.0033	.004	D.
December	.....	.....	4.45	.0029	.003	D.
January	.....	.....	41	.027	.03	D.
February	4,530	460	1,580	1.03	1.07	C.
March	1,150	242	563	.366	.42	B.
April	252	50	164	.106	.12	D.
May	5,900	50	1,260	.818	.94	D.
June	5,400	460	1,500	.974	1.09	B
July	4,850	252	1,830	1.19	1.37	C.
August	6,500	1,560	3,590	2.33	2.69	C.
September	2,460	460	921	.598	.67	C.
The year	6,500	.....	959	.623	8.45	

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 to September 30, 1915.

GAGE.—Chain gage attached to upstream side of bridge; read morning and evening, to hundredths, 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, 7.7 feet at 6.30 p. m. July 9; minimum stage, 1.52 feet May 13 to 15.

ACCURACY.—Gage-height record reliable.

COOPERATION.—Station maintained in cooperation with the Noblesville Heat, Light & Power Co., Noblesville, Ind.

Data inadequate for determining daily discharge.

Discharge measurements of West Fork of White River near Noblesville, Ind., during the year ending Sept. 30, 1915.

[Made by William Kessler.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 16	1.85	235
July 21	4.23	1,270
21	4.26	1,290

Daily gage height, in feet, of West Branch of White River at Noblesville, Ind., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	3.95	1.96	2.17	2.31	16	2.11	4.35	4.70	3.72	1.84
2	.....	3.9	2.01	2.06	2.23	17	2.49	3.37	5.75	3.06	1.82
3	.....	4.1	1.89	2.23	2.14	18	2.17	2.92	5.35	2.99	1.83
4	.....	3.7	1.95	5.62	2.10	19	1.93	2.71	4.45	2.72	2.36
5	.....	3.2	2.00	6.18	2.08	20	1.90	2.63	4.85	2.67	2.21
6	.....	2.89	1.97	3.88	2.08	21	2.01	2.55	4.25	4.80	2.03
7	.....	2.73	1.89	3.49	2.08	22	2.03	2.38	3.85	6.00	1.93
8	.....	3.02	5.95	3.24	2.06	23	2.11	2.20	3.40	5.58	1.84
9	.....	3.32	7.60	2.53	2.02	24	1.96	2.07	3.46	4.62	1.76
10	.....	2.36	7.20	2.50	1.98	25	1.83	1.98	2.69	3.65	1.76
11	.....	2.56	4.80	2.93	1.94	26	1.91	1.94	2.50	3.45	1.75
12	.....	2.42	4.05	4.78	1.90	27	1.89	2.09	2.37	3.09	2.89
13	1.52	2.40	3.55	6.48	1.83	28	2.28	2.31	2.32	2.88	4.28
14	1.53	2.11	3.17	5.08	1.83	29	4.70	2.03	2.29	2.68	3.52
15	1.52	4.63	4.00	3.80	1.85	30	4.5	.....	2.35	2.51	2.87
						31	4.4	.....	2.26	2.41	.....

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, 1915.

GAGE.—Chain gage attached to bridge. From January 1 to June 30, 1914, the gage was read each morning to tenths; for rest of the year it was read morning and evening to tenths.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Solid rock; permanent. Point of zero flow determined by soundings December 5, 1914; gage height, 0.6 foot±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.0 feet February 7 (discharge, 27,500 second-feet); minimum stage, 1.65 feet at 6 p. m. October 6, 6 p. m. November 3, and 7 a. m. November 4 (discharge, 128 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.

WINTER FLOW.—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.

ACCURACY.—Results good for low stages. Accuracy of records for medium and high stages depends upon permanence of discharge relation subsequent to 1911.

COOPERATION.—Gage-height records furnished by the United States Weather Bureau during part of year.

The following discharge measurement was made by B. J. Peterson:
December 5, 1914: Gage height, 2.23 feet; discharge, 377 second-feet.

Daily discharge, in second-feet, of East Branch of White River at Shoals, Ind., for the years ending Sept. 30, 1913–1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	1,500	985	610	830	15,000	9,460	.....	3,240	1,290	1,100	740	500
2	1,430	785	650	1,160	9,460	13,600	.....	3,000	1,290	985	650	465
3	1,040	830	1,100	1,290	8,380	14,900	.....	2,760	1,290	985	650	400
4	1,040	880	650	1,740	7,280	14,000	.....	2,530	1,160	740	535	695
5	930	985	570	1,580	5,210	13,200	.....	2,760	1,040	570	345	570
6	880	985	610	3,000	5,680	11,100	34,000	2,310	830	880	295	295
7	880	1,100	785	6,830	5,210	9,040	30,400	2,100	930	930	650	500
8	930	1,160	695	15,000	4,480	7,500	31,600	1,910	1,040	1,040	695	610
9	880	1,220	880	18,400	3,980	7,060	29,800	1,740	830	610	880	320
10	740	1,040	1,220	17,900	3,000	6,370	28,700	1,740	1,040	610	695	198
11	570	930	1,160	20,600	3,730	7,940	27,200	1,740	1,160	830	610	430
12	570	1,220	1,100	27,200	3,240	5,450	26,300	1,740	1,160	500	465	570
13	650	880	830	28,600	3,980	5,680	27,000	1,430	1,160	695	370	570
14	610	830	570	28,600	3,000	9,880	29,200	1,430	740	430	370	650
15	740	1,040	570	28,800	3,000	14,900	30,000	1,290	930	830	400	650
16	570	830	695	30,000	2,530	15,400	29,600	1,290	650	740	370	500
17	785	930	880	33,200	3,000	15,400	27,600	1,290	1,160	695	785	370
18	650	1,040	535	35,600	2,760	14,300	23,300	1,430	995	740	930	650
19	695	1,160	610	35,000	3,000	8,160	18,400	1,910	830	695	1,160	535
20	695	1,040	785	33,800	3,000	7,720	13,200	1,740	740	695	880	345
21	535	985	785	35,400	3,730	7,500	9,460	1,580	740	785	930	500
22	930	985	740	37,100	3,730	10,300	7,500	1,430	930	1,100	3,730	570
23	650	880	695	38,200	4,230	11,700	6,370	1,430	740	930	3,980	400
24	830	695	610	40,000	4,230	13,000	5,680	1,160	740	880	1,660	535
25	930	650	570	40,000	3,980	32,900	4,970	1,160	650	830	2,310	370
26	880	930	695	39,200	3,240	.....	4,730	1,430	650	880	1,740	370
27	650	930	740	38,400	3,240	.....	4,480	1,290	930	695	1,220	320
28	610	830	740	38,000	4,480	.....	4,230	1,040	1,160	610	830	650
29	880	610	610	36,200	.....	.....	4,230	1,290	1,040	465	740	500
30	785	650	650	32,000	.....	.....	3,240	1,290	570	465	650	345
31	930	.....	610	23,200	.....	.....	.....	1,290	.....	430	570	.....

Daily discharge, in second-feet, of East Branch of White River at Shoals, Ind., for the years ending Sept. 30, 1913–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	345	500	2,760	1,220	3,480	7,500	23,600	3,980	985	740	370	1,820
2	370	400	4,230	1,290	5,210	7,940	25,100	3,120	1,040	695	370	1,820
3	320	535	5,210	1,220	9,040	7,500	21,200	3,000	1,100	785	220	1,100
4	345	500	6,140	1,160	8,160	8,380	23,000	2,420	1,040	740	175	1,040
5	650	500	5,910	1,220	7,060	9,040	21,400	2,530	880	695	400	930
6	570	370	5,210	1,430	6,600	9,670	18,500	2,880	1,040	370	345	570
7	370	465	3,980	1,360	6,140	11,300	15,000	4,230	1,100	430	465	570
8	400	345	3,480	1,740	6,600	12,900	13,200	6,140	880	270	320	880
9	500	500	2,760	1,910	6,600	13,600	12,500	6,140	1,500	535	270	830
10	370	535	2,310	2,000	5,680	13,000	14,300	5,210	1,160	400	245	695
11	295	465	2,200	2,310	4,730	12,100	15,400	5,210	985	500	370	1,040
12	270	535	1,910	3,000	3,360	11,500	15,200	4,730	1,160	220	830	650
13	220	570	1,660	2,640	2,310	11,300	13,600	4,230	785	140	1,360	695
14	345	370	1,740	2,310	2,200	11,300	14,000	3,120	1,040	400	1,430	570
15	320	570	1,360	1,910	2,530	10,900	12,300	2,530	610	830	1,430	430
16	320	1,430	1,290	1,660	1,360	11,300	12,100	2,000	830	500	1,430	270
17	370	2,530	1,360	1,430	2,530	11,300	14,700	1,910	985	140	830	270
18	320	3,480	1,040	1,430	1,580	11,300	14,300	2,000	695	880	535	270
19	370	4,230	1,160	1,360	4,730	9,250	12,100	1,660	785	295	345	570
20	465	3,730	1,040	1,290	15,000	7,500	8,820	1,500	1,040	535	465	740
21	500	2,640	1,100	1,100	14,200	6,600	6,830	1,430	785	1,040	430	650
22	430	2,100	930	1,160	14,300	5,450	6,140	1,360	158	1,100	650	198
23	610	1,740	1,100	1,100	14,700	4,730	5,210	1,430	695	1,100	610	158
24	370	2,000	1,160	1,040	11,900	4,230	4,730	1,360	695	430	270	570
25	430	1,660	1,430	1,100	10,100	3,360	4,230	1,160	650	370	370	695
26	500	1,360	1,910	1,040	9,670	3,240	4,230	1,660	610	430	465	695
27	465	930	1,820	985	8,600	3,120	4,730	1,430	610	535	430	535
28	465	1,100	1,740	1,040	7,500	11,900	4,730	1,220	610	500	400	370
29	370	1,220	1,910	930	.....	16,700	4,730	1,100	158	465	570	320
30	430	1,040	1,580	985	.....	20,600	4,230	1,100	140	430	1,040	320
31	500	.....	1,430	1,160	.....	22,400	.....	740	.....	570	1,580	.....
1914–15.												
1	295	320	430	570	11,700	1,910	740	830	7,500	880	985	4,230
2	400	158	430	430	20,800	1,910	930	1,290	5,210	2,760	1,360	3,360
3	295	140	430	830	20,800	1,580	1,290	830	3,980	2,760	1,360	3,240
4	400	140	345	650	20,000	1,430	1,040	2,530	4,970	3,120	1,660	2,880
5	610	370	370	650	21,400	1,430	650	3,240	5,210	4,230	1,430	1,580
6	220	465	345	570	26,300	2,100	1,290	3,980	5,450	4,480	1,580	2,000
7	158	345	140	650	27,500	4,480	830	3,480	4,970	4,230	2,100	1,500
8	320	345	370	1,040	26,300	5,910	830	3,730	3,730	15,200	1,740	1,290
9	465	295	400	830	23,300	6,140	1,040	5,210	2,760	20,300	3,000	1,580
10	500	345	400	1,580	19,700	5,210	930	6,370	2,310	19,700	2,000	1,910
11	930	320	400	2,100	15,400	3,730	1,160	4,730	2,100	20,600	2,200	5,210
12	465	345	370	1,040	9,670	3,000	740	2,760	1,910	21,200	3,360	3,600
13	370	345	345	1,290	6,370	2,310	830	1,740	1,430	19,400	3,600	3,480
14	570	345	245	1,040	5,210	2,100	1,290	1,580	1,580	16,400	6,140	3,000
15	430	430	345	830	5,210	2,530	830	1,040	1,910	13,600	7,500	2,420
16	570	175	295	830	4,970	1,740	1,290	1,040	2,760	10,300	7,940	2,000
17	465	345	320	930	4,730	1,580	1,040	930	3,980	7,280	8,600	1,910
18	345	430	345	830	4,480	1,740	1,290	1,040	4,730	4,230	7,940	2,100
19	158	370	430	830	3,980	1,580	650	740	4,480	4,230	4,230	2,880
20	345	430	400	930	3,480	830	830	740	3,980	3,730	5,680	4,230
21	345	220	345	1,160	3,240	1,290	830	930	5,450	3,360	11,700	3,480
22	370	345	370	930	3,240	1,580	740	2,530	4,480	4,230	14,200	2,640
23	430	158	345	930	3,240	1,580	930	3,980	3,480	3,480	14,000	2,200
24	430	345	430	.....	2,760	1,040	1,430	5,910	2,760	2,200	14,000	2,200
25	345	320	430	.....	2,100	930	830	5,450	2,100	1,660	12,100	1,820
26	245	345	370	.....	2,100	1,290	1,160	4,730	1,910	2,530	10,100	1,290
27	400	295	430	.....	2,100	1,040	1,430	7,940	1,580	1,740	7,940	1,500
28	400	400	320	.....	1,910	1,160	1,430	10,100	930	985	7,500	1,160
29	430	430	500	.....	.....	1,290	1,290	11,700	1,580	1,660	5,210	1,500
30	345	175	1,040	.....	.....	1,290	1,290	11,500	1,740	1,100	5,910	740
31	270	.....	830	.....	.....	1,290	.....	10,100	.....	1,500	4,730	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge Jan. 24–31, 1915, estimated, because of ice, at 1,000 second-feet. Discharge, Oct. 1, 1912, to Mar. 25, 1913, published in Water-Supply Paper 353. No estimates prepared for the high stages Mar. 26 to Apr. 5, 1913, because of uncertainty as to correct rating. Accuracy of estimates for medium and high stages in the above table depends on permanency of the discharge relation subsequent to 1911.

Monthly discharge of East Branch of White River at Shoals, Ind., for the years ending Sept. 30, 1913–1915.

[Drainage area, 4,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1912–13.						
October	1,500	535	819	.167	0.19	A.
November	1,220	610	934	.191	.21	A.
December	1,220	535	740	.151	.17	A.
January	40,000	830	24,700	5.04	5.81	B.
February	15,000	2,530	4,640	.947	.99	B.
May	3,240	1,040	1,730	.353	.41	A.
June	1,290	570	947	.193	.22	A.
July	1,100	430	754	.154	.18	A.
August	3,980	295	995	.203	.23	A.
September	695	198	479	.098	.11	A.
1913–14.						
October	650	220	407	.083	.10	A.
November	4,230	345	1,280	.261	.29	A.
December	6,140	930	2,350	.480	.55	A.
January	3,000	930	1,470	.300	.35	B.
February	15,000	1,360	7,000	1.43	1.49	A.
March	22,400	3,120	10,000	2.04	2.35	A.
April	25,100	4,230	12,400	2.53	2.82	A.
May	6,140	740	2,660	.543	.63	A.
June	1,500	140	825	.168	.19	A.
July	1,100	140	551	.112	.13	A.
August	1,580	175	614	.125	.14	A.
September	1,820	158	676	.138	.15	A.
The year	25,100	140	3,320	.678	9.19	
1914–15.						
October	930	158	397	.081	.09	A.
November	465	140	316	.064	.07	A.
December	1,040	140	405	.083	.10	B.
January	2,100	430	951	.194	.22	B.
February	27,500	1,910	10,800	2.20	2.29	B.
March	6,140	830	2,160	.441	.51	A.
April	1,430	650	1,030	.210	.23	A.
May	11,700	740	3,960	.808	.93	A.
June	7,500	930	3,370	.688	.77	A.
July	21,200	880	7,200	1.47	1.70	A.
August	14,200	985	5,860	1.20	1.38	A.
September	5,210	740	2,430	.496	.55	A.
The year	27,500	140	3,190	.651	8.84	

NOTE.—See footnote to table of daily discharge.

LITTLE WABASH RIVER AT WILCOX, ILL.

LOCATION.—At highway bridge at Wilcox, Clay County, in sec. 3, T. 2 N., R. 8 E., third principal meridian, about 6 miles southeast of Clay City and about a quarter of a mile below mouth of Big Muddy Creek.

DRAINAGE AREA.—1,130 square miles.

RECORDS AVAILABLE.—August 22, 1914, to September 30, 1915.

GAGE.—Chain gage attached to bridge; read daily, in the morning, 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 a bridge across the drainage ditch about half a mile east of the highway bridge, as at extremely high stages river overflows the low ground between highway bridge and drainage ditch.

CHANNEL AND CONTROL.—Probably permanent; control is about 100 feet below the bridge. Point of zero flow, determined by soundings August 22, 1914, gage height, 1.2 feet±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 25.1 feet at 7.30 a. m. August 22, 1915 (discharge, about 8,820 second-feet); on August 23 water was too high for observer to reach gage (discharge about 10,000 second-feet); minimum stage recorded, 1.70 feet August 23, 1914 (discharge, 4 second-feet).

WINTER FLOW.—Ice may affect the discharge relation during parts of December, January, and February.

ACCURACY.—Results good except for extreme flood stages and for periods when discharge relation was affected by ice.

Discharge measurements of Little Wabash River at Wilcox, Ill., during the year ending Sept. 30, 1915.

[Made by William Kessler.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 26	8.32	91.3	June 14	4.67	237
26	3.32	92.2	July 22	5.69	371
May 27	17.14	3,240	22	5.63	356
27	17.72	3,400	Sept. 16	3.45	102
June 14	4.70	245	16	3.45	96.8

Daily discharge, in second-feet, of Little Wabash River at Wilcox, Ill., for the years ending Sept. 30, 1914 and 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1914.			11		390	21		19
1		103	12		244	22	5	17
2		161	13		134	23	4	15
3		108	14		76	24	12	14
4		52	15		49	25	5	12
5		34						
			16		98	26	56	10
6		32	17		63	27	25	10
7		390	18		43	28	23	9
8		390	19		37	29	409	9
9		280	20		23	30	256	8
10		648				31	144	

Daily discharge, in second-feet, of Little Wabash River at Wilcox, Ill., for the years ending Sept. 30, 1914 and 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915.												
1	8	12	10	300	3,310	1,200	60	36	5,730	2,590	361	347
2	7	12	10	300	4,770	484	57	32	4,910	2,530	319	244
3	6	12	9	300	5,050	333	56	31	4,910	1,380	1,580	208
4	6	10	12	300	4,700	268	55	31	4,350	468	2,020	184
5	6	9	14	300	4,490	333	51	18	3,360	375	2,040	161
6	6	9	14	300	4,490	614	48	405	2,380	420	2,170	144
7	5	10	14	300	4,630	917	47	319	1,620	532	2,040	144
8	5	10	17	300	4,350	827	44	648	1,200	665	917	161
9	9	10	21	300	4,070	580	45	863	548	1,260	347	293
10	232	10	19	300	3,360	405	46	631	333	2,230	244	256
11	500	34	19	300	1,540	319	44	256	232	3,210	308	208
12	1,100	32	19	300	597	268	46	150	196	3,820	827	390
13	1,010	25	21	300	390	220	47	103	172	4,210	1,360	333
14	452	21	19	300	452	196	139	76	256	4,420	1,220	184
15	172	21	19	300	548	172	139	63	375	4,350	1,400	123
16	89	17	19	300	516	161	55	51	1,010	4,140	2,440	108
17	67	17	17	300	405	150	47	48	917	4,140	3,020	94
18	49	14	15	300	306	144	43	39	405	2,860	3,700	103
19	41	14	21	300	244	139	39	32	256	1,740	4,070	232
20	118	12	32	300	208	128	38	55	172	1,500	4,560	1,480
21	94	10	30	300	184	118	36	184	631	614	4,910	1,620
22	56	10	30	300	184	118	36	1,600	2,980	420	8,820	899
23	40	9	30	300	1,600	118	36	1,900	4,420	268	[b]10,000	390
24	32	9	30	300	3,360	[a]108	36	1,140	4,210	196	7,110	244
25	30	10	30	300	4,000	98	37	420	3,880	156	6,050	184
26	22	9	30	300	3,940	89	48	665	2,980	139	5,570	139
27	21	9	30	300	3,640	84	103	2,350	1,180	118	4,980	118
28	17	9	30	300	2,740	76	150	3,700	375	108	4,560	98
29	15	9	30	300	.....	76	51	4,490	268	139	3,460	89
30	14	10	30	300	.....	71	43	5,810	1,480	420	1,640	80
31	12	.....	30	300	.....	67	.....	5,730	.....	347	500	.....

[a] Discharge interpolated.
[b] Discharge estimated; only approximate; water too high for observer to read gage.

NOTE.—Discharge determined from a rating curve fairly well defined below 4,000 second-feet. Discharge estimated, because of ice, from gage heights, observer's notes, and climatic records as follows: Dec. 21–31, 30 second-feet; Jan. 1–31, 300 second-feet; these estimates are based on inadequate data and should be used with caution.

Monthly discharge of Little Wabash River at Wilcox, Ill., for the years ending Sept. 30, 1914 and 1915.

[Drainage area, 1,130 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914.						
August 22–31	409	4	93.5	0.083	0.03	B.
September	648	8	116	.103	.11	B.
1914–1915.						
October	1,100	5	137	.121	.14	B.
November	34	9	13.5	.012	.01	B.
December	.....	9	21.6	.019	.02	D.
January	.....	.....	300	.265	.31	
February	5,050	184	2,430	2.15	2.24	C.
March	1,200	67	286	.253	.29	B.
April	150	36	57.4	.051	.06	B.
May	5,810	18	1,030	.912	1.05	C.*
June	5,730	172	1,860	1.65	1.84	B.
July	4,420	108	1,610	1.42	1.64	B.
August	[a]10,000	244	2,990	2.65	3.06	C.
September	1,620	80	299	.265	.31	B.
The year	[a]10,000	5	911	.806	10.97	

[a] Estimated; only approximate.

SKILLET FORK NEAR WAYNE CITY, ILL.

LOCATION.—In sec. 18, T. 2 S., R. 6 E., at Southern Railway bridge 1 mile east of Wayne City, in 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, 1915.

GAGE.—Standard chain gage attached to bridge; read daily, morning or afternoon, by J. C. Taylor.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge; in high water also from the downstream side of wooden trestle about 1 mile east of main channel; low-water measurements made about three-fourths mile below regular section by wading or from a boat.

CHANNEL AND CONTROL.—Channel practically permanent; rough. Control is remnant of rock dam at section. Point of zero flow determined by leveling August 20, 1914. Gage height, 1.6 feet—±0.1 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year: 23.1 feet at noon August 22. Minimum stage recorded: 2.0 feet October 6 to 8.

1908–1912 and 1914–15: Maximum stage recorded, 23.1 feet at noon August 22, 1915. Minimum stage recorded: 1.9 feet on 11 days in July and 4 days in August, 1914.

WINTER FLOW.—Discharge relation may be affected by ice during parts of December, January, and February.

DIVERSIONS.—About 30,000 gallons of water a day are pumped from the river above the gage into the service tank of the Southern Railway.

ACCURACY.—Gage readings reliable.

Data inadequate for estimates of discharge.

Discharge measurements of Skillet Fork near Wayne City, Ill., during the year ending Sept. 30, 1915.

[Made by William Kessler.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 27	2.64	23.4
May 28	19.77	3,730

Daily gage height, in feet, of Skillet Fork near Wayne City, Ill., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.1	2.38	2.28	5.4	21.0	4.2	2.55	2.45	18.1	10.4	5.2	2.75
2	2.08	2.3	2.28	4.9	21.2	2.7	2.52	2.45	12.3	13.5	5.3	2.7
3	2.08	2.3	2.25	3.85	20.9	3.3	2.52	4.0	8.9	7.5	8.6	2.6
4	2.05	2.3	2.3	3.1	20.4	3.0	2.52	4.8	4.8	4.2	7.8	2.6
5	2.05	2.3	2.4	2.8	20.0	4.6	2.44	3.0	13.0	5.0	4.8	2.6
6	2.0	2.3	2.4	2.8	19.5	9.3	2.44	2.82	17.3	5.8	3.6	2.5
7	2.0	2.3	2.5	9.0	17.6	9.2	2.44	6.1	15.5	5.5	3.0	2.6
8	2.0	2.55	2.55	10.7	10.6	7.2	2.44	10.4	11.0	10.0	2.68	2.55
9	5.0	2.6	2.7	8.8	5.5	5.6	2.44	4.4	5.1	13.8	2.58	2.58
10	15.2	2.6	2.55	6.5	4.1	4.7	2.44	3.7	3.42	9.8	2.55	2.5
11	18.3	3.5	2.6	4.9	4.0	4.1	2.45	3.0	3.0	6.3	2.65	2.5
12	16.4	3.5	2.6	4.4	3.9	3.6	2.45	3.0	2.87	8.4	2.5	2.5
13	9.2	2.8	2.6	4.0	3.9	3.2	2.45	2.8	2.75	10.6	2.65	2.5
14	5.4	2.6	2.6	4.0	4.5	3.2	2.44	2.8	2.75	7.5	7.0	2.5
15	3.1	2.55	2.6	4.0	5.1	3.0	2.44	2.52	2.65	5.5	17.6	2.5
16	3.1	2.52	2.6	4.0	4.8	3.0	2.44	2.45	2.7	4.0	16.9	2.5
17	3.3	2.45	2.4	9.0	4.1	3.0	2.43	2.45	2.64	3.3	14.8	2.5
18	3.4	2.3	2.4	10.0	3.45	2.8	2.33	2.45	2.64	2.9	16.1	2.5
19	3.0	2.3	2.5	8.6	3.1	2.8	2.33	2.42	2.51	5.8	13.2	2.5
20	2.7	2.25	2.6	5.6	2.9	2.75	2.33	2.7	2.54	9.0	17.0	2.5
21	2.6	2.25	2.7	4.4	2.78	2.6	2.33	8.1	15.4	8.4	21.1	2.4
22	2.5	2.25	3.65	4.0	2.92	2.6	2.33	10.2	19.0	5.0	23.1	3.34
23	2.5	2.25	4.0	4.0	15.1	2.6	2.32	8.0	19.2	3.2	22.0	2.85
24	2.4	2.25	3.7	4.0	18.8	2.6	2.32	7.7	19.0	2.8	21.1	3.1
25	2.4	2.25	3.7	3.9	18.1	2.5	2.32	5.4	15.5	2.6	20.7	2.8
26	2.4	2.25	3.7	3.0	16.4	2.5	2.80	12.8	6.8	2.6	19.3	2.7
27	2.4	2.25	2.7	2.7	9.0	2.51	2.71	18.1	3.9	6.6	13.2	2.55
28	2.4	2.25	2.6	2.7	5.0	2.62	2.62	19.8	5.2	6.3	6.1	2.6
29	2.38	2.3	2.6	2.7	.....	2.60	2.60	19.8	13.2	5.2	3.6	3.75
30	2.38	2.28	3.5	2.4	.....	2.59	2.60	19.7	17.0	3.6	3.15	2.7
31	2.38	.....	3.7	11.3	.....	2.55	.....	19.4	.....	6.7	2.9	.....

NOTE.—Discharge relation probably affected by ice about Dec. 22 to Jan. 31.

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 to September 30, 1915.

GAGE.—Staff, inclined and vertical, on right bank, 400 feet above brink of falls; established April 3, 1915, and read twice daily, to hundredths, by Alice Brunson. Original gage was an inclined and vertical staff 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 68 feet at the falls at low water.

EXTREMES OF STAGE.—Maximum stage recorded during year, 7.1 feet at 8 a. m. July 14; minimum, 1.54 feet September 20.

Highest known stage corresponds to about 12 feet on Survey gage; lowest stage said by residents of the locality to have occurred in October, 1908, at 0.58 foot on Viele, Blackwell & Buck's gage.

WINTER FLOW.—No ice at station.

DIVERSIONS.—None.

REGULATION.—Low-water flow may be affected by operation of power plant at Williamsburg, about 25 miles above the station.

ACCURACY.—Records excellent.

COOPERATION.—Station maintained in cooperation with the Kentucky Geological Survey, J. B. Hoeing, State geologist. Gage readings August 15, 1907, to October 31, 1910, and results of discharge measurements made in 1907 furnished by Viele, Blackwell & Buck; gage readings November 1, 1910, to December 10, 1911, furnished by H. M. Byllesby & Co.

Discharge measurements of Cumberland River at Cumberland Falls, Ky.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1907		*Feet.*	*Sec.-ft.*	1907.		*Feet.*	*Sec.-ft.*
Aug. 30	Wallace	1.05	361	Sept. 9	Gay, Benedict and Stabler.	2.40	2,710
Sept. 2	Gay and Stabler	.90	189	1915			
5	Benedict and Wallace	2.13	2,050	Apr. 3	Ellsworth and Sellier	2.48	1,870
6	do	1.97	1,810				
7	Gay and Benedict	1.61	1,160				

NOTE.—Measurements made in 1907 by engineers of Viele, Blackwell & Buck and refer to their original gage.

Daily gage height, in feet, of Cumberland River at Cumberland Falls, Ky., for the years ending Sept. 30, 1907 to 1911 and 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1907			1907			1907		
1	.....	0.91	11	.....	3.75	21	1.65	1.37
2	.....	.9	12	.....	5.05	22	1.65	1.94
3	.....	1.3	13	.....	3.83	23	1.6	3.48
4	.....	2.12	14	.....	2.93	24	2.6	3.2
5	.....	2.15	15	0.9	2.10	25	2.5	2.5
6	.....	1.95	16	.89	1.72	26	1.85	2.13
7	.....	1.61	17	.94	1.52	27	1.9	1.75
8	.....	1.48	18	1.0	1.36	28	1.9	1.52
9	.....	2.48	19	1.15	1.28	29	1.65	1.35
10	.....	2.68	20	1.65	1.19	30	1.08	1.24
						31	1.0	.....

Daily gage height, in feet, of Cumberland River at Cumberland Falls, Ky., for the years ending Sept. 30, 1907 to 1911 and 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1907–8.												
1	1.16	0.85	2.01	5.10	3.50	3.95	5.15	2.84	1.52	0.90	1.02	0.82
2	1.11	.98	1.84	3.70	4.55	.....	.....	2.72	1.45	.93	1.02	.79
3	1.06	1.08	1.74	3.02	4.28	.....	.....	2.72	1.50	.92	.97	.76
4	1.05	2.44	1.66	3.02	3.40	.....	.....	2.78	1.72	.90	.96	.72
5	1.05	2.30	1.62	4.52	3.22	4.15	5.32	2.90	1.65	.90	.95	.78
6	1.18	1.89	1.54	5.20	3.82	3.85	3.80	3.82	1.52	.92	.94	1.68
7	1.45	1.68	1.46	4.52	5.32	4.32	3.40	4.12	1.47	1.42	.93	2.65
8	1.72	1.54	1.38	3.78	4.80	4.00	3.08	4.20	1.42	2.02	.92	2.32
9	2.12	1.82	1.29	3.10	4.10	3.70	2.75	4.18	1.40	2.55	.90	1.80
10	2.35	3.45	1.30	2.70	3.58	3.30	2.58	3.68	1.32	2.16	.88	1.55
11	2.10	5.22	1.30	2.45	.....	3.45	2.55	3.18	1.20	1.82	1.39	1.35
12	1.76	5.25	1.38	3.12	.....	3.90	2.58	2.85	1.08	1.60	1.28	1.18
13	1.55	3.40	1.44	3.78	4.85	3.65	2.62	2.60	1.01	1.42	1.18	1.02
14	1.38	2.65	1.46	4.10	3.95	4.65	2.62	2.35	.97	1.30	1.08	.88
15	1.26	2.45	1.53	3.62	.....	4.08	2.65	2.89	.93	1.28	1.04	.82
16	1.18	2.20	1.70	3.22	.....	3.44	3.32	2.85	.89	1.45	1.00	.77
17	1.11	1.92	1.82	3.62	.....	3.35	3.42	2.55	.86	2.25	.96	.74
18	1.06	1.95	1.95	3.90	4.05	4.65	3.10	2.28	.82	2.08	.94	.72
19	1.01	2.20	2.02	3.38	3.30	.....	2.80	1.95	.80	1.52	.90	.70
20	.96	2.55	1.92	2.92	3.05	.....	2.72	2.05	.78	3.15	.84	.68
21	.94	2.66	1.86	2.68	2.80	5.00	2.58	2.02	.76	2.52	.86	.68
22	.90	2.68	1.92	2.40	2.55	4.15	2.42	1.92	.74	1.85	.91	.66
23	.89	3.22	1.95	2.28	2.42	3.75	2.20	1.82	.72	1.68	.92	.66
24	.89	5.08	1.91	2.18	2.35	3.52	2.09	1.72	.70	1.56	.90	.64
25	.85	5.95	2.75	2.08	2.28	3.35	3.50	1.62	.74	1.36	.88	.62
26	.84	4.78	2.75	2.02	2.20	3.22	.....	1.52	1.20	1.21	.86	.60
27	.81	3.32	2.55	2.12	2.40	2.95	.....	1.50	1.32	1.08	.94	.60
28	.80	2.75	2.42	2.20	3.10	2.75	5.00	1.50	1.22	1.01	.94	.60
29	.80	2.48	2.32	2.15	3.12	2.75	3.80	1.50	1.10	.97	.90	.61
30	.80	2.16	4.10	2.12	.....	3.00	3.10	1.58	.92	.94	.88	.59
31	.84	.....	6.00	2.32	.....	3.55	.....	1.62	.....	.96	.83	.....
1908–9.												
1	.....	.66	.86	2.60	2.05	3.30	4.55	4.75	1.45	3.30	1.10	.80
2	.59	.68	.90	2.57	1.92	2.92	3.95	.....	1.52	3.95	1.42	.80
3	.58	.70	1.02	2.52	1.89	2.68	3.18	5.20	1.70	3.66	1.92	.79
4	.58	.70	1.38	2.50	1.86	2.52	2.55	3.98	2.22	3.02	2.05	.78
5	.58	.68	1.48	2.58	1.95	2.38	2.38	3.58	2.85	2.50	2.29	.78
6	.58	.67	1.48	2.75	3.05	2.68	2.32	3.28	3.05	2.09	2.16	.76
7	.58	.66	1.58	2.80	4.35	3.75	2.88	2.94	2.68	2.85	1.81	.76
8	.60	.65	1.68	2.80	4.48	5.00	4.20	2.59	2.50	3.95	1.46	.75
9	.69	.65	2.26	2.73	3.92	.....	4.10	2.28	2.22	5.12	1.16	.75
10	.69	.69	2.25	2.64	4.55	.....	3.70	2.10	2.12	4.85	1.10	.76
11	.68	.95	1.95	2.58	.....	.....	3.38	2.28	2.82	3.75	1.12	.79
12	.68	.91	1.85	2.50	5.50	5.50	2.96	2.45	3.88	3.45	1.21	.78
13	.68	1.25	3.00	2.58	4.15	5.45	2.61	2.55	4.05	3.80	1.29	.80
14	.69	1.42	2.80	3.55	3.78	5.26	2.48	2.36	3.85	.....	1.31	.84
15	.64	1.32	2.45	5.25	3.82	5.08	2.41	2.14	4.14	5.48	1.34	.88
16	.60	1.18	2.10	.....	5.20	4.25	2.52	1.95	4.40	4.82	2.40	.92
17	.60	1.08	2.00	.....	.....	3.65	3.02	1.82	4.35	4.20	.....	.94
18	.60	.98	1.96	.....	.....	3.21	3.55	1.71	4.06	3.65	4.47	.95
19	.61	.92	1.92	5.28	4.92	2.80	4.35	1.55	3.69	3.14	2.80	.91
20	.60	.90	1.84	3.85	3.88	2.90	5.08	.....	3.30	2.58	2.31	.88
21	.60	.88	1.74	2.90	3.92	3.75	.....	.....	2.90	2.10	1.85	.86
22	.59	.88	1.72	2.63	4.62	3.98	.....	.....	2.32	1.82	1.49	.84
23	.58	.86	2.28	2.51	5.32	3.85	5.28	.....	2.00	1.54	1.17	.84
24	.58	.86	3.90	2.38	.....	3.81	4.72	.....	2.25	1.26	1.08	.83
25	.58	.85	3.90	2.28	.....	.....	4.22	.....	2.48	1.08	1.02	.82
26	.58	.84	3.60	2.18	.....	.....	3.68	.....	2.92	1.03	.98	.81
27	.58	.84	3.30	2.08	5.00	.....	3.66	.....	4.02	1.00	.92	.80
28	.59	.82	2.78	2.08	3.98	5.80	3.16	.....	4.15	.98	.89	.79
29	.60	.82	2.50	2.24	.....	5.62	2.75	.....	3.66	.96	.88	.78
30	.62	.80	2.52	2.20	.....	5.10	2.70	.....	2.95	.94	.84	.77
31	.64	.....	2.58	2.14	.....	.....	.....	.....	.....	.91	.82	.....

Daily gage height, in feet, of Cumberland River at Cumberland Falls, Ky., for the years ending Sept. 90, 1907 to 1911 and 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1	0.77	0.82	0.96	1.20	2.42	3.02	1.36	3.80	2.95	1.47	2.71	0.86
2	.76	.80	1.02	1.19	2.34	4.30	1.33	3.05	2.91	1.48	2.46	1.00
3	.75	.79	1.15	1.18	2.23	4.12	1.36	2.78	2.83	1.58	2.12	1.18
4	.74	.78	1.29	1.18	2.14	3.65	1.45	2.69	2.74	1.61	2.38	1.48
5	.74	.78	1.47	1.33	2.08	3.36	1.54	2.60	2.62	1.68	2.80	2.58
6	.72	.76	1.58	2.30	1.98	3.12	1.53	2.75	2.54	1.95	3.05	2.50
7	.72	.76	1.66	4.45	1.89	2.84	1.48	2.96	2.48	2.22	3.22	2.50
8	.70	.76	1.71	.....	1.80	2.54	1.42	3.10	2.41	2.22	3.58	2.72
9	.70	.78	1.76	4.75	1.72	2.32	1.37	3.52	2.38	3.95	3.50	2.92
10	.71	.80	1.81	4.10	1.66	2.16	1.34	4.40	2.36	3.75	3.10	3.78
11	.72	.80	1.81	3.65	1.70	2.04	1.32	5.08	3.35	3.55	2.82	3.58
12	.74	.79	1.74	3.32	1.84	1.99	1.38	5.52	4.16	3.42	2.66	3.44
13	.76	.78	1.70	2.97	1.98	1.97	1.50	5.36	3.85	3.28	2.45	3.32
14	.79	.78	1.62	2.65	2.10	1.95	1.68	4.85	3.66	3.16	2.24	3.18
15	.82	.76	1.58	2.40	2.22	1.92	1.80	4.19	3.51	3.12	1.98	2.90
16	.84	.76	1.54	2.34	2.36	1.89	1.88	3.68	3.35	3.12	1.76	3.58
17	.88	.78	1.50	2.55	2.72	1.86	2.60	3.15	3.14	3.72	1.58	2.36
18	.91	.82	1.46	3.00	.....	1.82	3.90	2.76	2.90	4.20	1.46	2.22
19	.94	.94	1.44	3.75	.....	1.79	4.15	2.56	2.51	4.12	1.32	2.02
20	.94	1.17	1.40	4.90	5.40	1.76	4.08	2.46	2.18	3.72	1.24	1.84
21	.93	1.24	1.36	5.28	4.95	1.72	3.88	2.44	1.95	3.41	1.22	.....
22	.92	1.21	1.34	4.78	4.52	1.68	3.82	2.58	1.85	3.15	1.18	.....
23	.91	1.18	1.33	4.12	3.99	1.64	4.02	2.69	1.71	2.92	1.16	.....
24	.90	1.21	1.32	3.70	3.76	1.59	4.28	3.05	1.85	2.68	1.13	.....
25	.90	1.24	1.30	3.60	3.46	1.55	4.60	4.70	1.64	2.39	1.09	.....
26	.88	1.16	1.28	3.43	3.25	1.51	4.85	5.40	1.66	2.00	1.06	.....
27	.87	1.06	1.26	3.31	2.96	1.48	4.98	5.12	1.82	2.12	1.02	.....
28	.86	1.12	1.26	3.05	2.78	1.44	5.12	4.80	1.72	2.05	.98	.....
29	.85	1.04	1.24	2.85	.....	1.42	4.95	4.22	1.58	2.12	.94	.....
30	.84	.96	1.22	2.60	.....	1.39	4.62	3.70	1.52	3.75	.89	.....
31	.82	.....	1.21	2.52	.....	1.37	.....	3.10	.....	3.16	.86	.....
1910–11.												
1	1.16	.86	2.55	3.80	4.34	2.25	2.58	.....	1.15	2.05	.98	.81
2	1.11	.92	2.40	.....	4.15	2.21	2.55	.....	1.00	1.88	.97	.78
3	1.07	.97	2.25	.....	3.98	2.18	2.52	5.30	.90	1.73	1.05	.75
4	1.02	1.00	2.04	.....	3.85	2.12	2.50	4.50	.88	1.60	1.40	.72
5	.98	.95	1.86	.....	3.95	2.02	.....	4.05	.86	1.52	1.60	.80
6	1.06	.90	2.22	4.65	4.32	3.05	.....	3.40	.88	1.50	1.45	1.05
7	1.28	.88	2.75	4.15	4.82	5.10	.....	2.70	.90	1.60	1.33	1.03
8	2.05	.87	3.95	3.70	5.00	.....	5.00	2.60	.93	1.70	1.20	1.01
9	1.95	.86	3.42	3.29	.....	.....	4.70	2.48	.95	1.60	1.05	.97
10	1.75	.88	2.70	2.94	4.90	.....	4.32	2.35	.96	1.52	.98	.95
11	1.50	.89	2.45	2.62	4.44	5.08	3.95	2.20	.90	1.48	.95	.93
12	1.36	.88	2.29	2.51	4.05	4.02	3.65	1.90	.87	1.50	1.05	.90
13	1.31	.86	2.14	2.43	3.85	3.54	3.45	2.10	.85	1.70	1.30	.87
14	1.26	.85	1.92	2.40	3.45	3.48	3.90	2.16	.82	1.80	1.90	1.02
15	1.21	.84	1.66	2.36	2.85	3.38	5.05	2.00	.80	1.70	2.25	1.06
16	1.16	.84	1.56	2.34	2.58	3.32	.....	1.95	.80	1.90	2.30	1.10
17	1.12	.82	1.48	2.30	2.70	3.14	5.20	1.90	.85	1.70	2.20	1.08
18	1.06	.82	1.43	2.26	3.08	2.98	4.65	1.85	.90	1.62	2.05	1.02
19	1.00	.80	1.36	2.21	3.34	2.90	3.80	1.81	.95	1.60	1.90	1.00
20	.95	.80	1.31	2.22	3.50	2.85	3.60	1.76	1.00	1.56	1.70	.98
21	.90	.81	1.34	2.50	3.32	2.75	3.35	1.72	1.40	1.50	1.65	1.00
22	.89	.82	1.48	3.10	2.98	2.70	3.15	1.65	1.50	1.43	1.60	1.10
23	.88	.82	1.66	3.90	2.82	2.62	3.00	1.74	1.60	1.40	1.48	1.18
24	.88	.80	1.82	4.90	2.59	2.55	2.85	1.85	1.45	1.37	1.20	1.25
25	.92	.80	1.86	4.35	2.49	2.45	2.75	1.80	1.40	1.35	1.05	1.40
26	.94	.79	1.98	3.90	2.36	2.48	2.62	1.76	1.35	1.30	1.02	1.30
27	.92	.81	2.08	3.60	2.34	2.55	2.40	1.68	1.30	1.20	.98	1.22
28	.90	.84	2.18	3.22	2.28	2.62	2.20	1.55	2.30	1.12	.94	1.15
29	.88	2.12	2.34	3.32	.....	2.70	2.10	1.48	2.10	1.09	.91	1.10
30	.86	2.68	2.60	3.88	.....	2.80	4.50	1.38	2.50	1.05	.88	1.02
31	.84	.....	3.00	4.30	.....	2.60	.....	1.25	.....	1.02	.85	.....

Daily gage height, in feet, of Cumberland River at Cumberland Falls, Ky., for the years ending Sept. 30, 1907 to 1911 and 1915—Continued.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1911.				1911.				1911.			
1	0.98	1.08	1.95	11	1.20	1.90	.....	21	2.55	2.70	.....
2	.95	1.05	1.80	12	3.15	1.85	.....	22	2.05	2.65	.....
3	.90	1.02	1.70	13	3.00	1.95	.....	23	1.60	2.61	.....
4	.85	.98	1.60	14	2.80	3.90	.....	24	1.45	2.55	.....
5	.90	.91	1.50	15	2.40	3.25	.....	25	1.35	2.45	.....
6	.95	.87	1.40	16	2.18	3.00	.....	26	1.28	2.40	.....
7	.92	1.28	1.30	17	2.00	2.65	.....	27	1.20	2.35	.....
8	.90	2.50	1.28	18	2.20	2.40	.....	28	1.18	2.27	.....
9	.93	2.28	1.25	19	3.90	2.45	.....	29	1.17	2.20	.....
10	1.00	2.05	1.22	20	3.00	2.85	.....	30	1.14	2.05	.....
								31	1.11	.....	.....

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1915.							1915.						
1	2.92	1.84	3.22	1.88	1.60	2.76	16	2.22	1.82	4.78	3.78	2.26	1.65
2	2.64	1.87	3.20	1.98	1.60	2.46	17	2.16	1.77	4.44	3.07	2.16	1.61
3	2.50	2.08	4.44	1.92	2.20	2.40	18	2.11	1.74	3.40	2.79	3.62	1.58
4	2.40	2.82	4.14	2.28	2.38	2.34	19	2.07	1.72	2.82	2.58	3.80	1.56
5	2.33	2.90	3.10	2.93	2.12	2.34	20	2.03	1.70	2.49	2.43	3.46	1.54
6	2.25	2.76	2.55	3.25	1.88	2.45	21	1.99	1.68	2.48	2.60	3.52	1.72
7	2.20	2.58	2.34	3.40	1.70	2.50	22	1.96	1.66	3.30	2.91	3.46	1.94
8	2.18	2.42	2.64	2.99	1.61	2.42	23	1.94	1.69	3.41	2.52	2.82	1.88
9	2.16	2.32	3.07	2.96	1.58	2.28	24	1.90	2.60	2.80	2.21	2.36	1.82
10	2.14	2.25	2.78	3.12	1.56	2.15	25	1.88	2.40	2.54	2.06	2.19	1.73
11	2.12	2.17	2.50	3.26	2.54	2.02	26	1.86	2.40	2.18	1.91	1.98	1.65
12	2.20	2.09	2.30	3.40	2.60	1.92	27	1.84	3.40	2.00	1.80	2.42	1.60
13	2.28	2.01	2.13	4.70	2.84	1.82	28	1.82	4.62	1.90	1.75	4.90	1.56
14	2.30	1.94	2.12	7.00	2.88	1.74	29	1.81	5.70	1.82	1.70	4.45	2.15
15	2.28	1.88	2.22	5.44	2.66	1.68	30	1.84	4.54	1.77	1.65	4.08	2.52
							31	.....	3.57	.....	1.62	3.30	.....

NOTE.—Water above top of gage on days for which gage height is not given except Oct. 1 and May 20–31, 1909: Sept. 21–30, 1910.

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 to September 30, 1915.

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 twice daily, to hundredths, for the United States Geological Survey, by C. M. Estes.

[1] Daily river stages, pt. 12, p. 29.

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 is 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, 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.

WINTER FLOW.—No ice at station.

DIVERSIONS.—None.

REGULATION.—Stage at low water will be affected by any manipulation of the level of pool No. 21 at the lock.

ACCURACY.—Records excellent except for effect of 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 measurement was made by Ellsworth and Sellier: March 3, 1915: Gage height, 3.84 feet; discharge, 2,320 second-feet.

Daily gage height, in feet, of Cumberland River at Burnside, Ky., for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	4.18	6.76	3.56	8.62	7.64	2.68	7.09
2	.....	4.00	6.27	3.42	7.74	8.19	2.75	5.81
3	.....	3.88	5.84	3.58	8.15	6.66	3.02	4.90
4	.....	3.78	5.46	5.73	10.08	6.34	3.96	4.28
5	.....	4.14	5.20	7.36	7.89	11.24	4.16	4.60
6	.....	6.72	4.92	6.48	6.37	12.42	3.66	6.72
7	.....	8.63	4.69	5.65	6.30	10.34	3.22	7.90
8	.....	7.96	4.50	5.12	10.32	8.48	2.92	6.42
9	.....	7.10	4.37	4.82	10.45	7.14	2.81	5.50
10	.....	6.48	4.22	4.46	8.71	6.24	2.90	4.68
11	.....	5.98	4.48	4.08	6.83	6.22	3.26	4.15
12	.....	5.58	5.02	3.75	5.59	8.62	7.18	3.80
13	.....	5.20	5.82	3.56	5.04	12.50	6.90	3.46
14	.....	4.94	5.66	3.42	4.72	20.74	6.50	3.18
15	.....	4.70	5.35	3.30	5.66	17.06	6.04	2.99
16	.....	4.92	5.00	3.20	10.90	11.90	6.24	2.89
17	.....	6.04	4.67	3.00	12.96	8.70	5.20	2.76
18	.....	7.46	4.49	2.86	9.84	7.18	6.48	2.70
19	5.95	9.72	4.27	2.74	7.84	6.01	10.05	2.63
20	5.68	14.38	4.12	2.67	6.87	5.54	8.70	2.50
21	5.40	15.44	3.96	2.70	8.38	10.19	8.59	2.78
22	5.15	13.47	3.84	2.70	11.04	9.45	9.14	3.10
23	4.95	11.82	3.76	3.79	9.60	7.20	7.50	3.70
24	4.78	11.12	3.62	10.17	7.62	5.60	5.85	3.49
25	4.70	11.05	3.52	8.29	5.99	4.64	4.78	3.16
26	4.65	10.96	3.44	6.76	4.89	3.91	4.08	2.93
27	4.48	10.19	3.41	12.40	4.33	3.54	3.82	2.78
28	4.30	9.87	3.39	16.62	3.74	3.22	10.92	2.66
29	.....	9.28	3.37	15.28	3.86	2.96	13.74	2.58
30	.....	8.21	3.56	13.64	4.70	2.84	11.03	4.73
31	.....	7.30	.....	9.63	.....	2.73	8.93	.....

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 1¼ 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 to Spetember 30, 1915.

GAGE.—Vertical staff gage in 5 sections bolted to rock ledges on left bank; read twice daily, to hundredths, by Mart Keith; a reference gage is attached to a tree on the left bank 110 feet below cable.

DISGHARGE MEASUREMENTS.—Made from cable about 2,000 feet below gage or by wading at low stages.

CHANNEL AND CONTROL.—Probably permanent; position of low-water control has not been determined.

EXTREMES OF STAGE.—Maximum stage recorded during year, 19.8 feet at 6.20 a. m. July 21; minimum stage, 2.51 feet at 6.30 a. m. August 10.

WINTER FLOW.—No ice at the station.

DIVERSIONS.—None.

REGULATION.—Operation of a small power plant short distance above gage may affect flow at extreme low water.

ACCURACY.—Records excellent.

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, 1915.

Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*
Mar. 10	Ellsworth and Sellier	4.88	1,530
Apr. 9	C. E. Ellsworth	3.72	816

Daily gage height, in feet, of South Fork of Cumberland River at Nevelsville, Ky., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	4.68	3.40	4.26	7.19	3.00	5.23
2	.....	4.54	3.20	4.70	5.51	3.04	4.79
3	.....	4.38	3.46	5.21	4.52	3.68	4 25
4	.....	4.26	8.25	4.63	8.37	3.82	3.90
5	.....	4.13	7.04	4.08	9.99	3.36	5.22
6	.....	4.02	5.52	4.86	10.20	2.98	9.14
7	.....	3.90	4.72	6.82	7.28	2.72	8.22
8	.....	3.80	4.51	9.16	5.66	2.47	6.36
9	.....	3.73	4.33	8.67	4.81	2.64	5.23
10	4.80	3.63	3.98	6.64	4.40	2.56	4.58
11	4.65	3.68	3.69	5.14	4.10	4.62	4.17
12	4.42	4.12	3.50	4.63	5.68	6.22	3.86
13	4.22	5.12	3.40	4.54	6.30	5.38	3.56
14	4.05	4.88	3.31	4.51	10.16	4.28	3.33
15	3.93	4.48	3.20	7.65	7.68	5.30	3.14
16	4.35	4.26	3.02	12.42	6.10	5.56	3.01
17	5.42	4.06	2.88	8.92	6.18	4.60	2.90
18	5.99	3.91	2.74	6.58	4.92	7.70	2.80
19	7.03	3.76	2.65	5.52	4.84	8.20	2.72
20	9.65	3.62	2.62	4.91	4.98	7.04	2.64
21	9.11	3.54	2.54	5.20	17.55	8.48	2.92
22	7.74	3.44	2.56	6.80	9.30	7.84	3.88
23	7.04	3.38	2.79	5.66	6.47	5.42	3.82
24	6.40	3.29	6.96	4.56	5.11	4.82	3.28
25	6.01	3.22	4.68	3.96	4.37	4.16	2.98
26	5.78	3.20	4.96	3.64	3.89	3.74	2.79
27	5.62	3.12	9.26	3.38	3.52	4.97	2.66
28	5.56	3.06	7.61	3.24	3.34	14.38	2.56
29	5.28	3.05	6.65	3.13	3.05	10.13	4.86
30	4.96	4.10	5.24	4.45	2.88	8.22	4.88
31	4.78	.....	4.45	.....	2.74	6.56	.....

TENNESSEE RIVER BASIN.

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

LOCATION.—At highway bridge known as Smith's Bridge, about a mile below the Southern Railway station at Asheville, Buncombe County, and about 2 miles below mouth of Swannanoa River.

DRAINAGE AREA.—987 square miles.

RECORDS AVAILABLE.—March 19, 1903, to September 30, 1915. Estimates of discharge available from January 1, 1905, to September 30, 1915.

GAGES.—Vertical staff attached to one of the bridge piers, and an auxiliary chain gage attached to the bridge in the first panel to the left of the staff gage. Staff gage ends at zero; chain gage is used for readings below zero; both gages are adjusted to the same datum, which has remained unchanged since they were established; gage read once daily to tenths.

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

CHANNEL AND CONTROL.—Channel practically permanent; bed composed chiefly of rock but is not excessively rough. Current good at all points.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet October 16 (discharge, 17,600 second-feet); minimum stage recorded, —0.9 foot October 2 (discharge, 590 second-feet).

1905–1915: Maximum stage recorded, 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).

WINTER FLOW.—Discharge relation not affected by ice.

ACCURACY.—Record considered good. No discharge measurements were made during the year ending September 30, 1915, but a measurement made October 22, 1915, checks the rating curve.

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

Daily discharge, in second-feet, of French Broad River at Asheville, N. C., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	670	1,100	13,600	3,770	4,150	3,240	2,320	1,710	2,750	5,900	1,190	1,290
2	590	1,100	14,300	3,240	9,940	3,070	2,190	1,600	4,980	5,200	1,710	1,190
3	670	1,100	11,100	3,070	9,650	2,910	2,190	1,600	4,150	3,240	1,940	1,190
4	1,290	1,100	9,360	2,910	8,230	2,750	2,060	1,940	2,910	2,460	2,600	1,290
5	1,390	1,010	13,000	2,750	6,140	2,910	2,060	1,600	2,460	4,550	1,490	5,430
6	1,010	1,010	11,100	2,910	6,640	6,390	2,060	1,490	2,320	2,910	1,290	5,900
7	830	1,010	9,360	4,350	5,660	5,200	2,060	1,490	2,060	2,320	1,290	3,410
8	830	1,010	5,900	9,070	5,200	4,350	2,060	4,150	2,600	1,940	1,190	2,190
9	830	1,100	4,350	6,140	4,550	3,590	1,940	2,750	2,060	1,940	1,190	1,940
10	750	1,100	3,770	4,960	4,350	3,240	1,940	2,190	1,710	1,820	1,190	1,820
11	670	1,100	3,240	3,770	3,960	3,070	1,940	1,940	1,710	1,940	1,190	1,820
12	670	1,010	2,910	5,200	3,410	3,070	1,940	1,940	1,710	1,820	1,820	1,710
13	670	1,010	2,910	6,640	3,240	2,750	1,940	3,410	2,060	1,820	2,060	1,710
14	920	1,010	2,910	5,200	3,240	2,600	1,940	2,600	1,820	1,820	1,820	2,190
15	3,770	3,240	2,600	4,150	2,190	2,600	1,820	2,190	1,940	1,710	1,600	2,190
16	17,600	4,150	2,600	3,770	5,200	2,600	1,820	1,940	1,940	1,940	1,490	1,710
17	14,600	3,410	2,460	3,770	4,350	2,750	1,710	1,820	2,600	1,710	1,390	1,710
18	9,360	2,600	2,320	6,640	3,590	2,460	1,710	1,710	2,190	1,600	1,290	1,390
19	7,960	1,820	2,190	9,070	3,410	2,320	1,710	1,600	1,820	1,820	1,390	1,490
20	2,190	1,600	2,320	8,790	3,240	2,320	1,600	1,940	1,710	1,600	3,240	1,290
21	1,820	1,390	2,750	7,420	3,070	2,460	1,600	1,820	2,060	1,820	3,410	1,390
22	1,820	1,390	3,590	4,980	2,910	2,460	1,600	1,710	1,710	1,490	3,410	1,490
23	1,600	1,390	2,910	4,350	2,910	2,320	1,600	1,600	1,490	1,820	2,060	1,290
24	1,600	1,290	2,750	4,550	4,760	2,190	1,600	1,940	1,390	1,600	1,820	1,290
25	1,710	1,290	4,350	5,430	5,900	2,190	1,600	1,710	1,390	1,490	1,600	1,290
26	1,600	1,190	10,200	5,200	4,350	2,060	1,600	1 600	1,390	1,290	1,390	1,190
27	1,600	1,190	8,230	4,550	3,770	2,190	1,600	1,600	1,390	1,390	1,390	1,190
28	1,490	1,190	4,980	3,960	3,410	2,060	1,600	1,820	1,290	1,290	1,390	1,190
29	1,290	1,490	3,960	3,770	.....	2,060	2,060	3,070	1,490	1,390	1,290	1,190
30	1,100	12,100	6,140	3,410	.....	1,940	1,820	2,750	4,980	1,290	1,290	1,190
31	1,100	.....	4,550	3,240	.....	2,190	.....	2,060	.....	1,190	1,290	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 900 and 11,000 second-feet. Discharge, Jan. 10 and 12, interpolated.

Monthly discharge of French Broad River at Asheville, N. C., for the year ending Sept. 30, 1915.

[Drainage area, 987 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	17,600	590	2,710	2.75	3.17	B.
November	12,100	1,010	1,850	1.87	2.09	B.
December	14,300	2,190	5,700	5.78	6.66	B.
January	9,070	2,750	4,870	4.93	5.68	B.
February	9,940	2,190	4,690	4.75	4.95	B.
March	6,390	1,940	2,850	2.89	3.33	A.
April	2,320	1,600	1,860	1.88	2.10	A.
May	4,150	1,490	2,040	2.07	2.39	A.
June	4,980	1,290	2,200	2.23	2.49	A.
July	5,900	1,190	2,130	2.16	2.49	A.
August	3,410	1,190	1,700	1.72	1.98	B.
September	5,900	1,190	1,850	1.87	2.09	A.
The year	17,600	590	2,870	2.91	39.42	

TENNESSEE RIVER AT CHATTANOOGA, TENN.

LOCATION.—At Hamilton County highway bridge in the city of Chattanooga, just below Chattanooga Island, 4 miles below South Chickamauga Creek, 3 miles above Chattanooga Creek, 33 miles above Hales Bar dam, 188 miles below junction of French Broad and Holston rivers, and 464 miles above mouth of Tennessee River.

DRAINAGE AREA.—21,400 square miles (measured on topographic sheets).

RECORDS AVAILABLE.—April 1, 1874, to October 21, 1913; March 1 to September 30, 1915.

GAGES.—As this station is within the backwater influence of the Hales Bar dam, two gages, 7 miles apart and set at same datum, are used in order to determine variation in the slope of water surface caused by the operation of the power plant at Hales Bar dam. Gage No. 1 is a sloping iron section (railroad T rail) bolted to rock and a vertical timber attached to the rock cliff on the left bank at the foot of Lookout Street, Chattanooga, about 200 feet upstream from the bridge; gage No. 2 is a vertical staff gage in three sections fastened to trees on left bank about 100 feet above the Cincinnati Southern Railroad bridge, 7 miles above Chattanooga. Sea-level elevation of gage No. 1, as published by the U. S. Weather Bureau, is 617.8 feet; gage No. 2 is set at same datum. Gage No. 1 is read daily to hundredths, at 7 a. m. and 5 p. m., by O. B. Gladish; gage No. 2 is read daily to hundredths, at 7 a. m. and 5 p. m., by Walter Ashworth.

DISCHARGE MEASUREMENTS.—Made from the downstream footway of Hamilton County highway bridge.

CHANNEL AND CONTROL.—Channel practically permanent. The control is now formed by the Hales Bar dam and power plant.

EXTREMES OF DISCHARGE.—Maximum stage recorded March 1 to September 30, 1915, 16.10 feet at 7.30 a. m. July 7 (discharge, 66,300 second-feet); minimum stage recorded, 7.25 feet at 7.30 a. m. September 30 (discharge, 10,400 second-feet).

1874–1915: Maximum stage recorded, 54.0 feet at 7 a. m. March 1, 1875 (discharge, 361,000 second-feet); minimum stage recorded, 0.0 foot September 11–14, 1881, and September 19, 1883 (discharge, 4,800 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

REGULATION.—The operation of the power plant at Hales Bar dam produces slight fluctuations in stage at the station. The principal effect produced by the operation of this plant is, changing the slope of the water surface at the station.

ACCURACY.—Results considered good although there may be some error in estimates for individual days, especially during low water, because of diurnal fluctuation produced by the power plant.

Discharge measurements of Tennessee River at Chattanooga, Tenn., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height in feet.		Discharge.	Date.	Made by—	Gage height in feet.		Discharge.
		Gage No. 1.	Gage No. 2.				Gage No. 1.	Gage No. 1.	
Apr. 7	Warren E. Hall and L. J. Hall	*Feet.* 9.64	*Feet.* 12.22	*Sec.-ft.* 24,100	June 18	L. J. Hall	11.28	(c)	36,200
13	L. J. Hall	11.61	14.78	39,300	July 12	do	10.54	13.31	31,400
16	do	11.26	14.13	36,000	13	Warren E. Hall and L. J. Hall	9.99	12.78	28,700
30	do	8.50	11.03	18,800	30	L. J. Hall	7.17	10.00	15,100
May 3	do	8.05	10.96	19,200	Aug. 4	do	5.95	9.38	12,800
5	do	8.76	11.41	20,700	14	do	6.10	9.43	13,400
8	do	10.45	*a*	30,500	16	do	7.66	10.76	18,400
10	do	13.32	16.26	48,200	17	Warren E. Hall and L. J. Hall	8.79	11.07	20,000
11	do	12.37	15.20	41,600	Sept. 8	L. J. Hall	*d* 12.02	14.42	34,800
31	do	9.15	11.70	22,100	9	do	*d* 12.58	14.73	35,000
June 2	do	9.85	12.64	27,300	15	do	*d* 8.86	10.55	14,900
4	do	13.53	16.78	53,100	29	do	*d* 7.21	9.28	11,000
11	do	9.44	*b*	25,300					
14	do	8.53	11.04	19,300					

a Fall between gages Nos. 1 and 2 determined from mean daily gage height to be 2.75 feet.
b Fall between gages Nos. 1 and 2 determined from mean daily gage height to be 2.80 feet.
c Fall between gages Nos. 1 and 2 determined from mean daily gage height to be 2.86 feet.
d Three-foot flash boards on Hales Bar dam when these measurements were made.

Daily discharge, in second-feet, of Tennessee River at Chattanooga, Tenn., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	43,500	31,200	18,400	25,800	17,600	13,900	22,500
2	40,000	31,600	18,500	27,000	27,200	13,200	21,900
3	37,100	31,400	19,000	31,900	32,100	13,200	19,600
4	34,300	30,200	20,200	51,200	35,100	13,300	17,500
5	38,500	28,400	21,200	41,900	46,600	13,800	21,100
6	48,800	27,100	23,800	33,700	61,400	14,200	28,000
7	54,200	25,800	25,500	27,300	66,000	14,200	25,300
8	50,300	25,000	31,300	28,700	58,100	13,400	33,700
9	47,500	24,400	43,900	29,900	46,400	12,700	34,800
10	43,400	24,900	47,400	28,200	39,100	12,500	28,900
11	39,900	27,100	41,100	24,600	34,600	12,600	24,100
12	37,400	32,700	33,600	21,600	30,400	12,500	20,200
13	35,200	39,300	28,800	19,700	27,800	13,100	17,300
14	33,500	41,300	27,700	19,500	32,600	13,400	15,600
15	31,900	35,800	27,700	22,000	42,400	14,200	14,900
16	31,600	34,800	26,100	29,700	38,200	17,700	15,300
17	31,800	31,900	23,400	36,900	38,000	17,600	15,100
18	32,500	29,600	21,500	35,100	31,600	17,200	14,600
19	33,200	26,800	19,700	29,200	26,700	16,100	13,700
20	35,000	25,100	19,300	26,100	25,900	20,200	12,300
21	36,900	23,400	19,000	23,000	26,500	24,400	11,200
22	37,200	22,500	18,700	20,900	31,600	25,100	10,700
23	35,600	21,500	18,400	20,200	33,300	23,900	11,500
24	34,100	20,900	18,200	21,200	33,100	22,400	13,600
25	32,400	20,500	17,700	20,400	27,200	20,300	12,900
26	30,800	20,200	19,400	18,000	23,400	17,700	11,900
27	29,500	20,500	21,900	16,400	20,000	15,700	11,300
28	29,000	19,800	24,800	15,900	17,900	16,100	10,800
29	28,900	19,600	24,000	16,600	16,600	17,200	10,700
30	28,700	19,100	24,500	16,100	15,400	23,100	10,600
31	30,300	.....	22,100	.....	14,700	24,300	.....

NOTE.—Discharge determined from a rating curve well defined above 11,000 second-feet.

Monthly discharge of Tennessee River at Chattanooga, Tenn., for the year ending Sept. 30, 1915.

[Drainage area, 21,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March	54,200	28,700	36,500	1.71	1.97	A.
April	41,300	19,100	27,100	1.27	1.42	A.
May	47,400	17,700	24,700	1.15	1.33	A.
June	51,200	15,900	26,000	1.21	1.35	A.
July	66,000	14,700	32,800	1.53	1.76	A.
August	25,100	12,500	16,700	.780	.90	A.
September	34,800	10,600	17,700	.827	.92	A.

TENNESSEE RIVER AT FLORENCE, ALA.

LOCATION.—At Southern Railway bridge about a mile south of Florence, just below the foot of Little Muscle Shoals and the lower end of Pattons Island, 8 miles below the mouth of Shoal Creek, about 3 miles above upper end of Sevenmile Island, 208 miles below Chattanooga, Tenn., and 256 miles above the mouth of the Tennessee.

DRAINAGE AREA.—30,800 square miles.

RECORDS AVAILABLE.—November 7, 1871, to September 30, 1915.

GAGE.—A rod gage consisting of four sections of steel, three-eighths inch by 7¼ 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. For description of gages used prior to September 30, 1913, see Water Supply Paper 353, page 151.

DISCHARGE MEASUREMENTS.—Made from downstream side of 17-span combined railway and highway bridge, using highway section, which is the low level or through section of bridge. The obstruction of the current by numerous piers makes careful discharge measurements necessary.

CHANNEL AND CONTROL.—Channel rocky and probably permanent, though rough and uneven. Discharge measurements made during a period of 27 years indicate that the control is practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 19.2 feet at 8 a. m. and 4 p. m. December 31 (discharge, 231,000 second-feet); minimum stage recorded, – 0.4 foot October 5 to 11 (discharge, 8,950 second-feet).

1872–1915: Maximum stage recorded, 32.5 feet at 10 and 12 p. m. March 19, 1897 (discharge, 499,000 second-feet); minimum stage not known; see Water Supply Paper, 353, page 155.

WINTER FLOW.—Discharge relation not materially affected by ice.

REGULATION.—The Hales Bar dam, 175 miles upstream, may cause some diurnal fluctuation but none has been noticeable to date.

ACCURACY.—Records good.

Discharge measurements of Tennessee River at Florence, Ala., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 31	M. R. Hall and Lederle.	18.90	215,000	Feb. 16	M. R. Hall and Hyde..	6.55	62,000
Jan. 1	....do.....	17.90	199,000	Sept. 12	W. E. Hall and L. J.		
Feb. 12	....do.....	8.80	84,300	13	Hall.....	3.64	34,500

Daily discharge, in second-feet, of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9,400	12,800	14,500	204,000	152,000	55,200	44,600	23,100	27,700	18,200	18,200	23,100
2	9,400	12,800	15,100	184,000	185,000	57,000	44,600	23,100	28,500	20,900	18,200	27,700
3	9,400	11,800	14,500	146,000	194,000	53,400	44,600	23,100	28,500	20,900	17,500	27,700
4	9,400	10,800	16,300	120,000	196,000	51,600	43,700	22,400	30,100	26,900	16,300	26,100
5	8,950	10,800	35,200	93,800	191,000	52,500	42,800	22,400	32,600	37,800	16,300	23,100
6	8,950	10,300	65,300	78,800	185,000	58,800	41,200	20,900	46,200	46,200	15,700	26,100
7	8,950	10,300	93,800	71,300	184,000	60,600	39,400	26,100	47,100	54,300	15,700	32,600
8	8,950	10,300	111,000	75,500	175,000	72,300	36,000	29,300	41,200	67,300	15,700	38,600
9	8,950	10,300	113,000	81,000	157,000	72,300	34,400	34,400	36,900	73,300	16,300	41,200
10	8,950	10,300	105,000	85,400	135,000	66,300	32,600	36,000	32,600	69,300	16,900	36,900
11	8,950	10,300	78,800	90,200	105,000	62,400	31,800	42,000	32,600	57,000	18,200	41,200
12	9,400	10,300	65,300	102,000	87,800	58,800	34,400	52,500	32,600	49,800	20,900	36,900
13	10,800	9,850	53,400	117,000	75,500	52,500	39,400	49,800	32,600	42,800	16,300	32,600
14	11,800	9,850	42,800	117,000	68,300	50,700	44,600	44,600	31,000	39,400	16,300	26,900
15	12,300	9,850	35,200	109,000	64,300	46,200	48,000	36,000	29,300	36,000	15,700	23,100
16	12,800	9,850	32,600	106,000	62,400	43,700	48,900	34,400	26,100	37,800	15,700	20,200
17	11,800	9,850	31,800	106,000	58,800	44,600	48,000	32,600	24,600	45,400	15,700	18,800
18	11,800	9,850	31,000	114,000	57,000	44,600	43,700	31,000	29,300	46,200	15,700	17,500
19	15,100	9,850	31,000	125,000	55,200	43,700	39,400	30,100	36,000	43,700	18,800	16,900
20	49,800	10,300	26,100	125,000	55,200	42,800	37,800	27,700	39,400	41,200	24,600	16,300
21	56,100	9,850	28,500	125,000	55,200	42,800	36,000	24,600	36,000	36,900	26,900	16,300
22	48,000	12,800	29,300	125,000	52,500	43,700	34,400	23,100	32,600	33,500	26,100	15,700
23	39,400	15,100	37,800	124,000	48,900	43,700	31,000	21,600	29,300	30,100	27,700	15,700
24	32,600	15,100	49,800	126,000	48,000	44,600	29,300	21,600	26,100	32,600	31,000	15,100
25	24,600	13,900	92,600	122,000	47,100	43,700	27,700	20,200	23,100	36,000	31,000	15,100
26	20,200	13,900	138,000	97,400	47,100	42,800	26,100	19,500	23,100	36,900	29,300	14,500
27	17,500	12,800	175,000	99,800	48,000	42,800	24,600	19,500	23,800	34,400	27,700	15,100
28	16,300	12,800	194,000	109,000	51,600	41,200	23,100	20,200	23,100	30,100	27,700	15,700
29	15,100	12,300	202,000	114,000	.....	39,400	23,100	22,400	20,200	30,100	24,600	15,100
30	13,900	12,800	226,000	109,000	.....	38,600	23,100	26,100	17,500	23,100	23,800	16,300
31	13,400	.....	231,000	101,000	.....	41,200	.....	27,700	.....	20,900	26,100	.....

NOTE.—Discharge determined from a rating curve well defined between 10,000 and 250,000 second-feet.

Monthly discharge of Tennessee River at Florence, Ala., for the year ending Sept. 30, 1915.

[Drainage area, 30,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	56,100	8,950	17,500	0.568	0.65	B.
November	15,100	9,850	11,400	.370	.41	A.
December	231,000	14,500	77,900	2.53	2.92	B.
January	204,000	71,300	113,000	3.67	4.23	B.
February	196,000	47,100	101,000	3.28	3.42	A.
March	72,300	38,600	50,100	1.63	1.88	A.
April	48,900	23,100	36,600	1.19	1.33	A.
May	52,500	19,500	28,600	.929	1.07	A.
June	47,100	17,500	30,700	.997	1.11	A.
July	73,300	18,200	39,300	1.28	1.48	A.
August	31,000	15,700	20,900	.679	.78	B.
September	41,200	14,500	23,600	.766	.85	B.
The year	231,000	8,950	45,700	1.48	20.13	

TENNESSEE RIVER AT JOHNSONVILLE, TENN.

LOCATION.—At the Nashville, Chattanooga & St. Louis Railway freight elevator, about 1,000 feet below the railway bridge at Johnsonville, Humphreys County, 96 miles from the mouth of the Tennessee, and 160 miles below Florence, Ala.

DRAINAGE AREA.—38,500 square miles.

RECORDS AVAILABLE.—October 1, 1875, to September 30, 1915. Records from October 1, 1875, to September 30, 1913, published in Water-Supply Paper 353.

GAGE.—Staff at freight elevator on right bank, about 1,000 feet below the Nashville, Chattanooga & St. Louis Railway bridge.

DISCHARGE MEASUREMENTS.—Made from downstream side of through-type railway bridge, of six spans and draw span.

CHANNEL AND CONTROL.—No information relative to control. Channel at measuring section at bridge composed of bowlders and coarse gravel; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 30.0 feet February 6 (discharge, 248,000 second-feet); minimum stage recorded, 0.2 foot October 9 to 11 (discharge, 9,990 second-feet).

The highest unquestioned record is a stage of 48 feet on March 24, 1897.

WINTER FLOW.—Discharge relation not materially affected by ice.

REGULATION.—Flow probably not affected by other than natural causes.

ACCURACY.—Records good.

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

No discharge measurements were made at this station during the year.

Daily discharge, in second-feet, of Tennessee River at Johnsonville, Tenn., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11,600	16,100	13,700	221,000	173,000	52,800	43,200	25,900	28,400	19,700	26,500	38,300
2	11,100	14,800	14,500	226,000	201,000	62,000	49,000	25,900	30,300	19,700	26,500	32,900
3	10,800	14,100	14,800	223,000	224,000	65,200	50,500	25,300	32,900	20,700	21,800	31,000
4	10,800	13,400	15,600	219,000	238,000	59,600	51,300	25,300	34,900	24,100	20,700	29,600
5	10,500	13,400	16,100	203,000	244,000	58,800	50,500	24,100	29,600	29,600	20,700	29,600
6	10,500	12,600	18,700	173,000	248,000	63,600	46,800	23,500	29,000	30,300	20,700	29,600
7	10,200	12,000	36,300	137,000	242,000	66,100	45,400	22,900	32,900	36,300	18,700	27,700
8	10,200	11,600	66,900	107,000	239,000	73,500	43,900	23,500	43,900	43,900	17,800	27,700
9	9,990	12,300	91,500	93,200	236,000	74,400	42,500	23,500	46,800	54,300	16,100	31,600
10	9,990	12,300	106,000	80,300	228,000	83,800	42,500	26,500	38,300	66,900	16,100	40,400
11	9,990	11,600	107,000	91,500	.....	82,900	37,600	32,900	32,900	74,400	16,100	39,700
12	10,200	11,400	97,500	95,800	.....	76,900	36,300	36,300	32,900	74,400	18,300	39,700
13	10,500	11,100	80,300	107,000	.....	68,500	36,300	48,300	32,900	59,600	20,700	39,000
14	10,800	11,100	66,900	126,000	.....	65,200	38,300	55,800	32,900	39,700	22,900	36,300
15	11,600	10,800	53,500	137,000	.....	59,600	46,800	53,500	31,600	37,600	20,200	32,900
16	12,000	10,800	44,700	133,000	.....	54,300	49,800	46,800	30,300	37,600	18,700	29,600
17	12,600	10,500	41,100	129,000	.....	52,000	49,000	41,100	30,300	36,300	17,800	25,300
18	13,000	10,800	36,300	118,000	.....	49,800	50,500	35,600	30,300	32,900	17,400	24,100
19	12,600	10,500	32,900	126,000	.....	49,000	49,800	34,900	26,500	43,200	18,300	20,700
20	12,300	11,400	31,000	141,000	.....	46,800	46,800	32,900	29,600	46,800	22,400	19,700
21	14,800	11,400	29,600	152,000	.....	46,800	45,400	31,600	32,900	46,800	26,500	18,700
22	40,400	11,400	30,300	163,000	.....	46,100	39,700	29,600	37,000	41,100	29,600	18,700
23	49,800	11,400	31,600	163,000	.....	45,400	38,300	29,600	38,300	36,300	32,900	18,700
24	45,400	11,400	32,900	166,000	58,800	47,600	38,300	31,600	32,900	32,900	30,300	18,700
25	39,000	11,400	46,800	169,000	57,300	48,300	32,900	29,600	26,500	29,600	30,300	18,700
26	32,900	13,700	96,700	176,000	54,300	48,300	31,600	28,400	26,500	31,600	31,600	16,900
27	29,600	15,200	142,000	154,000	52,800	48,300	29,000	26,500	25,300	31,600	37,600	16,100
28	20,700	15,200	172,000	140,000	52,800	47,600	28,400	25,300	24,100	32,900	39,000	16,100
29	18,300	14,100	190,000	133,000	.....	46,800	28,400	23,500	20,700	26,500	39,700	16,100
30	16,100	14,100	197,000	131,000	.....	45,400	25,900	21,800	22,400	29,600	42,500	17,400
31	16,100	.....	208,000	126,000	.....	43,200	.....	26,500	.....	26,500	41,100	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge Feb. 11–23 estimated because of backwater from Ohio River, at 75,000 second-feet.

Monthly discharge of Tennessee River at Johnsonville, Tenn., for the year ending Sept. 30, 1915.

[Drainage area, 38,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	49,800	9,990	17,600	0.457	0.53	A.
November	16,100	10,500	12,400	.322	.36	A.
December	208,000	13,700	69,700	1.81	2.09	B.
January	226,000	80,300	147,000	3.82	4.40	B.
February	248,000	52,800	126,000	3.27	3.40	C.
March	83,800	43,200	57,400	1.49	1.72	B.
April	51,300	25,900	41,500	1.08	1.20	B.
May	55,800	21,800	31,200	.810	.93	B.
June	46,800	20,700	31,500	.818	.91	B.
July	74,400	19,700	38,500	1.00	1.15	B.
August	42,500	16,100	25,100	.652	.75	B.
September	40,400	16,100	26,700	.694	.77	A.
The year	248,000	9,990	51,700	1.34	18.21	

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 above mouth of Watauga River.

DRAINAGE AREA.—828 square miles.

RECORDS AVAILABLE.—July 17, 1900, to September 30, 1915.

GAGE.—Vertical staff attached to downstream side of bridge pier nearest the right bank; read once daily, to tenths.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge; also from railroad bridge 300 feet above, 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 6.2 feet at 5 p. m. December 25 (discharge, 8,270 second-feet); minimum stage recorded, 0.0 foot October 3 and 4 and November 8 and 9 (discharge, 185 second-feet).

1900–1915: 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).

WINTER FLOW.—Discharge relation not affected by ice.

ACCURACY.—Records only fair, owing to difficulty of making accurate discharge measurements.

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

Discharge measurements of South Fork of Holston River at Bluff City, Tenn., during the year ending Sept. 30, 1915.

[Made by Mathers and Morgan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 14	0.10	270
17	.72	377

Daily discharge, in second-feet, of South Fork of Holston River at Bluff City, Tenn., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	212	212	325	2,760	1,680	1,190	860	650	590	370	325	1,190
2	212	212	1,280	2,130	7,620	1,100	785	590	715	530	285	1,100
3	185	212	1,680	1,790	6,780	940	715	530	860	370	530	860
4	185	212	1,480	1,480	4,560	940	715	715	860	475	420	940
5	212	212	4,560	1,280	3,460	1,020	650	940	785	785	420	1,280
6	212	212	3,180	1,380	2,900	1,100	650	715	715	1,380	370	3,910
7	212	185	1,900	4,390	2,370	1,280	650	715	650	715	370	2,130
8	212	185	1,380	4,560	2,010	1,380	650	1,190	530	940	325	1,380
9	212	245	1,100	2,900	1,790	1,280	650	940	530	1,100	325	1,100
10	212	325	940	2,250	1,680	1,190	650	785	420	1,190	285	940
11	185	285	860	1,680	1,480	1,100	715	650	420	1,100	1,790	860
12	185	245	785	3,040	1,380	1,100	1,280	650	370	1,020	3,320	860
13	185	212	715	3,320	1,280	1,020	1,380	590	370	940	1,480	860
14	212	212	650	2,370	1,190	940	1,190	590	325	860	1,280	940
15	245	212	475	2,130	1,190	940	1,020	590	370	715	1,100	1,100
16	420	325	325	2,250	1,380	940	860	590	650	530	1,020	860
17	530	530	285	2,370	1,280	1,020	785	530	530	475	1,020	650
18	475	475	475	3,320	1,190	1,100	715	475	420	785	940	785
19	530	370	530	3,320	1,190	1,190	650	475	370	715	1,380	785
20	420	325	1,190	2,760	1,100	1,190	650	475	325	785	1,280	650
21	370	325	1,900	2,250	1,020	1,020	590	420	325	1,190	940	715
22	325	285	1,900	1,680	1,020	940	590	420	370	1,190	785	785
23	285	285	1,790	1,580	940	940	590	420	325	860	650	860
24	285	245	1,380	1,790	1,190	860	530	530	325	940	530	715
25	285	245	5,260	3,320	1,790	860	530	650	285	715	475	590
26	245	285	6,380	3,180	1,680	785	530	650	285	475	475	530
27	245	285	3,320	2,630	1,480	940	475	785	285	420	420	530
28	245	285	2,370	2,130	1,280	940	475	860	245	370	590	475
29	245	325	1,790	1,900	.....	940	475	715	245	370	785	650
30	212	325	3,180	1,680	.....	940	650	590	245	325	1,100	1,900
31	212	.....	4,060	1,580	.....	860	.....	530	.....	325	1,100	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 400 and 2,500 second-feet.

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for the year ending Sept. 30, 1915.

[Drainage area, 828 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	530	185	271	0.327	0.38	C.
November	530	185	276	.333	.37	C.
December	6,380	285	1,850	2.23	2.57	B.
January	4,560	1,280	2,430	2.93	3.38	B.
February	7,620	940	2,070	2.50	2.60	B.
March	1,380	785	1,030	1.24	1.43	B.
April	1,380	475	722	.872	.97	B.
May	1,190	420	644	.778	.90	C.
June	860	245	458	.553	.62	C.
July	1,380	325	741	.895	1.03	B.
August	3,320	285	842	1.02	1.18	B.
September	3,910	475	1,030	1.24	1.38	B.
The year	7,620	185	1,030	1.24	16.81	

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

LOCATION.—At Virginia & Southwestern Railway bridge near Austins Mill, a small railway station 3 miles south of Rogersville, Hawkins County, 150 feet below the mouth of Honeycut Creek and about 2 miles below Dodson Creek, both small streams from the south.

DRAINAGE AREA.—3,060 square miles.

RECORDS AVAILABLE.—March 10, 1902, to September 30, 1915. Estimates of discharge available beginning January 1, 1904.

GAGE.—Vertical staff attached to downstream side of bridge pier nearest the right bank; read once daily to tenths.

DISCHARGE MEASUREMENTS.—Made from the steel highway bridge about half a mile above gage.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.8 feet at 3 p. m. December 26, 1914 (discharge, 33,800 second-feet); minimum stage recorded, 1.3 feet October 4 to 15 and November 7 to 11 and 15 (discharge, 680 second-feet).

1904–1915: Maximum stage recorded, 19.1 feet March 28, 1913 (discharge, approximately 67,000 second-feet); minimum stage recorded, 1.0 foot October 23 to November 3, 1904 (discharge, 490 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice.

ACCURACY.—Records fair. No discharge measurements were made during the years ending September 30, 1913, 1914, and 1915, but a measurement made October 23, 1915, checks a rating curve made January 16, 1913, indicating that there has been no change in the discharge relation since that date. Estimates of discharges prepared for these years are given in the following tables.

COOPERATION.—Gage maintained and gage-height records furnished by the United States Weather Bureau.

Daily discharge, in second-feet, of Holston River near Rogersville, Tenn., for the years ending Sept. 30, 1913–1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13.												
1	1,570	1,030	1,030	7,150	7,470	10,600	8,800	2,780	7,150	1,570	1,390	1,760
2	1,570	1,210	1,030	4,770	7,470	8,120	7,150	2,560	5,340	2,150	1,570	1,700
3	1,570	1,210	1,210	3,720	5,930	6,530	6,530	3,000	5,340	1,760	1,950	1,570
4	1,390	1,030	1,950	3,720	7,150	5,050	5,930	2,780	4,230	1,760	1,760	1,390
5	1,390	1,030	3,230	3,720	8,120	4,500	5,340	2,780	5,050	2,150	1,570	1,390
6	1,390	1,030	4,500	3,720	7,150	4,230	5,340	2,560	4,770	2,350	1,390	1,210
7	1,210	1,210	3,470	6,530	6,530	3,720	5,050	2,780	3,970	2,150	1,390	1,760
8	1,210	2,350	2,780	6,230	5,050	3,000	4,500	2,780	3,970	1,760	6,230	1,570
9	1,210	3,720	2,150	7,790	4,500	2,780	4,230	2,780	6,530	1,570	3,230	1,570
10	1,210	2,780	2,150	6,530	4,230	2,780	4,230	2,560	4,770	1,390	1,950	1,570
11	1,210	1,950	1,950	5,050	4,230	3,230	3,720	2,560	4,230	1,390	1,760	1,390
12	1,210	1,570	1,760	5,630	7,150	4,500	3,470	2,350	3,470	1,390	1,570	1,390
13	1,210	1,390	1,760	6,840	8,120	4,500	6,530	2,350	3,000	1,760	1,570	1,390
14	1,390	1,390	1,570	7,150	5,930	11,400	7,150	2,150	3,000	1,760	1,390	1,210
15	1,760	1,390	1,570	5,630	5,340	38,600	6,840	1,950	2,780	1,570	1,570	1,210
16	1,760	1,570	1,210	4,500	4,770	39,400	6,840	1,950	2,780	1,760	2,350	1,390
17	1,570	1,390	1,210	3,970	4,500	21,400	6,840	3,230	2,560	1,570	1,950	1,210
18	1,570	1,390	1,390	4,230	3,970	11,800	6,230	4,230	2,350	1,570	1,570	1,390
19	1,570	1,390	1,390	4,770	3,470	8,800	5,630	3,720	2,350	1,570	1,390	1,760
20	1,390	1,390	1,390	4,500	3,000	7,150	5,050	3,000	2,350	1,570	1,570	1,760
21	1,570	1,210	1,210	5,630	3,230	6,530	4,230	2,780	2,150	1,570	1,390	1,950
22	1,390	1,210	1,210	6,230	3,230	7,150	3,720	2,560	1,950	1,760	1,570	1,950
23	1,210	1,030	1,210	6,230	3,230	6,840	3,720	4,230	1,950	1,760	1,760	3,720
24	1,210	1,030	1,390	7,150	3,000	5,930	3,470	13,800	1,950	1,570	1,950	2,350
25	1,210	1,030	1,210	14,200	3,000	5,340	3,470	18,600	1,950	1,390	2,350	1,950
26	1,210	1,030	1,210	14,200	2,780	5,050	3,230	9,490	2,350	1,390	1,760	1,760
27	1,210	1,030	1,210	12,600	5,930	20,200	2,780	8,460	2,150	1,570	1,570	1,570
28	1,210	1,030	1,390	21,800	9,850	67,000	2,780	17,800	1,950	1,570	1,570	1,570
29	1,210	1,210	1,390	16,600	.....	24,600	2,780	16,600	1,760	1,570	1,390	1,570
30	1,210	1,210	2,560	10,600	.....	13,800	2,780	10,200	1,760	1,570	1,390	1,390
31	1,210	.....	4,770	8,120	.....	10,600	.....	7,790	.....	1,390	1,950	.....

Daily discharge, in second-feet, of Holston River near Rogersville, Tenn., for the years ending Sept. 30, 1913–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	1,570	1,570	1,390	1,760	2,780	4,770	21,800	3,470	1,390	850	1,030	2,350
2	1,760	1,390	1,570	1,950	4,230	4,500	15,000	3,470	1,390	850	1,030	1,950
3	1,570	1,390	1,570	2,150	4,230	3,970	13,000	3,000	1,390	850	850	1,760
4	1,390	1,390	1,570	2,150	3,720	3,720	9,850	2,780	1,390	850	850	1,760
5	1,390	1,210	1,760	2,150	3,000	3,720	7,790	3,230	1,570	1,030	850	1,570
6	1,390	1,210	1,570	2,150	2,780	3,720	6,840	3,970	1,570	1,030	850	1,390
7	1,390	1,210	1,950	1,950	6,230	3,970	5,930	7,150	1,570	1,030	850	1,030
8	1,390	1,210	2,150	1,950	9,140	5,050	5,630	5,930	1,570	850	850	1,030
9	1,390	1,210	1,950	1,950	8,120	5,050	6,230	5,050	1,570	850	850	1,030
10	1,210	1,760	1,950	2,150	5,630	4,500	5,930	4,230	1,390	850	850	1,210
11	1,210	2,150	1,760	3,470	4,770	4,230	4,770	3,970	1,210	850	1,030	1,210
12	1,210	1,950	1,760	4,770	4,230	7,150	4,500	3,470	1,210	1,030	850	1,570
13	1,390	1,760	1,570	3,720	3,720	18,200	4,230	3,230	1,210	1,030	1,030	1,570
14	1,390	1,760	1,570	2,780	5,050	11,000	3,720	3,230	1,210	1,030	1,030	1,570
15	1,390	1,760	1,570	2,150	4,770	8,120	5,630	3,000	1,390	1,760	1,210	1,210
16	1,390	1,760	1,570	1,950	3,970	6,530	9,140	2,780	1,210	3,970	2,560	850
17	1,390	1,760	1,570	1,950	3,230	5,930	8,120	2,560	1,210	2,350	1,760	850
18	1,210	2,350	1,390	1,760	2,780	6,530	7,150	2,350	1,210	1,760	1,030	850
19	1,210	3,230	1,390	1,760	3,230	7,790	7,150	2,350	1,390	1,760	1,030	850
20	1,390	2,560	1,390	1,760	6,840	7,150	9,490	2,350	1,760	1,760	850	850
21	1,760	1,760	1,210	1,760	13,000	6,840	11,400	2,150	1,760	1,570	850	850
22	1,950	1,760	1,210	1,760	11,400	5,930	9,490	1,950	1,210	1,030	850	850
23	1,760	1,760	1,210	1,950	8,120	5,930	7,150	1,950	1,030	1,030	850	850
24	1,760	1,760	1,210	1,950	7,470	5,340	6,230	1,760	1,030	1,030	850	850
25	1,760	1,760	1,210	2,150	9,140	5,340	5,340	1,570	1,030	850	1,030	1,030
26	3,000	1,570	3,000	3,720	7,470	4,770	4,770	1,570	1,030	850	2,350	850
27	2,350	1,570	3,000	5,050	6,530	4,500	4,770	1,570	1,030	850	4,230	850
28	1,950	1,390	2,780	3,720	5,630	4,500	4,500	1,570	850	850	14,600	850
29	1,760	1,390	2,150	3,230	.....	5,050	3,970	1,390	850	2,560	12,600	850
30	1,760	1,390	1,950	2,780	.....	6,840	3,720	1,390	850	1,950	5,050	850
31	1,570	.....	1,760	2,350	.....	28,600	.....	1,390	.....	1,570	3,720	.....
1914–15.												
1	850	850	1,030	9,850	5,340	4,500	3,000	2,560	1,760	1,210	1,210	2,350
2	850	850	7,150	7,150	24,200	3,970	2,780	2,350	2,150	1,570	1,390	2,350
3	850	850	7,470	5,930	29,000	3,720	2,560	2,350	2,780	1,760	1,570	1,950
4	680	860	6,530	5,050	17,000	3,470	2,560	2,350	2,560	1,950	1,570	1,760
5	680	850	9,490	4,500	11,800	3,470	2,560	3,230	2,560	7,470	1,570	1,760
6	680	850	13,800	3,720	8,800	3,970	2,350	2,780	2,350	5,050	1,570	6,530
7	680	680	8,460	8,120	8,120	4,500	2,150	3,230	2,150	3,470	1,570	7,470
8	680	680	5,930	21,400	7,470	3,970	2,150	3,470	1,760	2,150	1,390	5,050
9	680	680	4,230	10,600	6,530	3,720	2,560	4,230	1,760	1,760	1,390	3,720
10	680	680	3,970	8,120	5,630	3,470	2,350	3,720	1,760	1,760	1,210	2,780
11	680	680	3,000	6,230	5,050	3,230	2,560	2,780	1,570	1,760	1,210	2,560
12	680	850	2,780	8,120	4,500	3,230	3,470	2,350	1,570	1,570	3,230	1,950
13	680	850	2,350	13,000	4,230	3,230	5,050	2,350	1,390	1,760	5,050	1,760
14	680	850	2,150	9,490	3,970	3,000	5,050	2,150	1,390	2,780	4,230	1,760
15	680	680	1,950	7,790	3,720	2,780	3,970	2,150	1,390	2,780	2,780	1,950
16	1,760	850	1,760	7,150	3,720	2,780	3,470	2,150	1,760	2,350	1,950	2,780
17	6,530	1,950	1,760	7,150	4,770	3,000	3,230	2,150	1,950	1,760	1,760	1,950
18	3,470	1,760	1,760	8,120	3,970	4,230	2,780	1,950	1,950	3,720	1,760	1,760
19	2,350	1,570	1,950	9,490	3,470	3,720	2,560	1,760	1,760	2,780	2,780	1,760
20	1,950	1,390	3,970	9,140	3,470	3,720	2,350	1,760	1,570	2,150	2,780	1,760
21	1,950	1,390	8,120	8,120	3,230	3,720	2,150	1,570	1,570	11,400	3,230	3,230
22	1,760	1,210	7,790	6,530	3,230	3,230	1,950	1,570	1,570	5,050	2,150	2,780
23	1,570	1,030	6,840	5,340	3,230	3,000	1,950	1,570	1,570	3,720	2,150	2,780
24	1,570	1,030	5,340	5,630	3,470	3,000	1,950	1,950	1,570	2,560	1,760	1,950
25	1,390	1,030	11,400	9,140	6,230	3,000	1,760	2,780	1,390	2,350	1,570	1,760
26	1,390	1,030	33,400	11,000	6,530	3,000	1,760	2,780	1,210	1,950	1,390	1,570
27	1,390	1,030	15,800	9,140	5,630	2,780	1,570	2,780	1,210	1,760	1,390	1,570
28	1,210	1,030	9,140	11,000	5,050	3,000	1,570	2,350	1,210	1,760	1,760	1,390
29	1,030	1,030	7,150	6,840	.....	3,000	1,570	2,350	1,210	1,570	2,350	1,210
30	850	1,030	8,460	5,340	.....	3,000	1,950	1,950	1,030	1,390	3,230	1,760
31	850	.....	13,000	5,050	.....	3,000	.....	1,950	.....	1,390	3,230	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 1,000 and 12,000 second-feet.

Monthly discharge of Holston River near Rogersville, Tenn., for the years ending Sept. 30, 1913–1915.

[Drainage area, 3,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1912–13.						
October	1,760	1,210	1,360	0.444	0.51	B.
November	3,720	1,030	1,410	.461	.51	B.
December	4,770	1,030	1,850	.605	.70	B.
January	21,800	3,720	7,400	2.42	2.79	B.
February	9,850	2,780	5,300	1.73	1.80	B.
March	67,000	2,780	12,100	3.95	4.55	C.
April	8,800	2,780	4,950	1.62	1.81	B.
May	18,600	1,950	5,390	1.76	2.03	B.
June	7,150	1,760	3,330	1.09	1.22	B.
July	2,350	1,390	1,670	.546	.63	B.
August	6,230	1,390	1,860	.608	.70	B.
September	3,720	1,210	1,650	.539	.60	B.
The year	67,000	1,030	4,030	1.32	17.85	
1913–14.						
October	3,000	1,210	1,580	.516	.59	B.
November	3,230	1,210	1,690	.552	.62	B.
December	3,000	1,210	1,730	.565	.65	B.
January	5,050	1,760	2,480	.810	.93	B.
February	13,000	2,780	5,760	1.88	1.96	B.
March	28,600	3,720	6,750	2.21	2.55	B.
April	21,800	3,720	7,440	2.43	2.71	B.
May	7,150	1,390	2,900	.948	1.09	B.
June	1,760	850	1,280	.418	.47	B.
July	3,970	850	1,310	.428	.49	B.
August	14,600	850	2,200	.719	.83	B.
September	2,350	850	1,170	.382	.43	B.
The year	28,600	850	3,000	.980	13.32	
1914–15.						
October	6,530	680	1,350	.441	.51	B.
November	1,950	680	1,000	.327	.36	B.
December	33,400	1,030	7,030	2.30	2.65	B.
January	21,400	3,720	8,170	2.67	3.08	B.
February	29,000	3,230	7,190	2.35	2.45	B.
March	4,500	2,780	3,400	1.11	1.28	B.
April	5,050	1,570	2,590	.846	.94	B.
May	4,230	1,570	2,430	.794	.92	B.
June	2,780	1,030	1,710	.559	.62	B.
July	11,400	1,210	2,790	.912	1.05	B.
August	5,050	1,210	2,130	.696	.80	B.
September	7,470	1,210	2,520	.824	.92	B.
The year	33,400	680	3,510	1.15	15.58	

Days of deficiency in discharge of Holston River at Rogersville, Tenn., for the years ending Sept. 30, 1904–1915.

Discharge in second-feet.	Days of deficient discharge.											
	[a] 1904	1904–5	1905–6	1906–7	1907–8	1908–9	1909–10	1910–11	1911–12	1912–13	1913–14	1914–15
490	.....	0	.....	.....	.....	.....	.....	0	.....	.....	.....	.....
600	.....	12	.....	.....	.....	.....	.....	1	.....	.....	.....	0
750	0	28	0	.....	.....	.....	.....	9	0	.....	0	18
900	12	39	11	.....	.....	.....	0	27	12	0	43	33
1,100	16	55	20	.....	0	0	2	59	21	12	69	44
1,300	26	61	33	.....	3	10	58	74	28	48	96	55
1,500	43	71	55	.....	10	19	74	116	45	89	129	72
1,700	84	95	63	0	14	26	86	152	57	130	159	99
1,900	84	95	69	2	25	37	99	173	80	154	197	136
2,100	111	111	77	9	38	56	118	186	103	172	216	159
2,400	139	146	107	34	64	73	163	199	133	191	236	191
2,700	154	160	117	41	76	86	176	206	148	198	240	202
3,000	177	185	154	92	96	108	204	221	185	216	248	224
3,400	200	227	188	123	117	116	228	240	214	232	261	251
3,800	207	243	216	159	137	138	268	256	231	249	276	274
4,200	215	261	244	203	170	161	298	260	239	253	283	282
4,800	224	271	264	230	198	197	316	283	259	279	304	292
5,400	244	286	292	252	226	217	326	292	274	292	314	306
6,000	250	303	310	278	263	233	332	304	288	301	324	311
7,000	256	324	320	295	284	270	343	315	300	319	334	321
8,000	264	333	337	316	310	299	353	327	318	334	344	332
10,000	269	343	353	334	332	327	362	338	338	343	354	350
15,000	272	363	362	351	355	355	365	352	355	354	361	359
20,000	274	365	364	358	363	359	.....	357	360	358	363	361
25,000	.....	.....	364	360	363	362	.....	359	362	362	364	363
30,000	.....	.....	364	362	364	364	.....	364	364	362	365	364
40,000	.....	.....	364	364	365	365	.....	365	365	364	.....	365
50,000	.....	.....	364	365	366	.....	.....	.....	366	364	.....	.....
60,000	.....	.....	365	.....	.....	.....	.....	.....	.....	364	.....	.....
70,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	365	.....	.....

[a] Jan. 1 to Sept. 30, 1904.

DOE RIVER AT BLEVINS, TENN.

LOCATION.—At Eastern Tennessee & Western North Carolina Railroad bridge one-fourth mile west of Blevins, Carter County, and 4½ miles above the mouth of Little Doe River.

DRAINAGE AREA.—62.2 square miles.

RECORDS AVAILABLE.—December 16, 1911, to September 30, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading at section about one-fourth mile above bridge.

CHANNEL AND CONTROL.—Practically permanent. Point of zero flow, determined by leveling September 10, 1912, about gage height 1.2 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.82 feet at 8.45 a. m. February 2 (discharge, 426 second-feet); minimum stage recorded, 1.63 feet at 8.45 a. m. October 10 (discharge, 18 second-feet).

1912–1915: Maximum stage recorded, 4.75 feet March 27, 1913 (discharge, 1,540 second-feet); minimum stage, 1.61 feet December 16, 1913 (discharge, 16 second-feet).

WINTER FLOW.—Discharge relation may be occasionally affected by ice during extremely cold weather.

ACCURACY.—Results good except for stages above 300 second-feet.

The following discharge measurement was made by Mathers and Morgan:
October 16, 1914: Gage height, 2.35 feet; discharge, 204 second-feet.

Daily discharge, in second-feet, of Doe River at Blevins, Tenn., for the years ending Sept. 30, 1912–1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	.....	.....	.....	119	134	139	251	251	73	61	64	29
2	.....	.....	.....	102	99	128	481	185	69	53	59	29
3	.....	.....	.....	96	108	116	313	196	122	59	69	31
4	.....	.....	.....	86	113	105	225	163	83	163	69	28
5	.....	.....	.....	53	91	102	173	163	78	163	53	28
6	.....	.....	.....	119	119	108	153	156	88	108	53	17
7	.....	.....	.....	150	119	108	156	167	83	71	49	31
8	.....	.....	.....	131	113	122	128	156	64	170	45	49
9	.....	.....	.....	122	80	192	110	125	57	137	47	31
10	.....	.....	.....	108	86	156	110	119	59	102	57	29
11	.....	.....	.....	.....	108	131	102	108	51	153	49	26
12	.....	.....	.....	.....	110	192	93	102	51	116	33	26
13	.....	.....	.....	.....	128	204	93	83	47	91	39	61
14	.....	.....	.....	.....	71	192	83	86	69	102	41	33
15	.....	.....	.....	.....	78	940	86	208	150	64	41	33
16	.....	.....	86	.....	71	441	80	110	102	59	41	33
17	.....	.....	49	.....	71	220	91	128	69	53	41	29
18	.....	.....	41	.....	75	180	93	99	119	64	37	45
19	.....	.....	41	.....	75	160	96	93	75	446	61	47
20	.....	.....	39	.....	78	153	86	88	61	220	57	28
21	.....	.....	67	113	225	140	75	83	49	173	71	26
22	.....	.....	122	108	204	122	200	78	51	163	80	26
23	.....	.....	143	105	156	110	150	73	61	137	61	153
24	.....	.....	143	57	177	204	125	69	55	110	41	75
25	.....	.....	146	57	143	167	108	108	57	247	41	55
26	.....	.....	143	61	332	140	99	69	53	122	41	55
27	.....	.....	156	61	327	134	192	67	51	110	41	64
28	.....	.....	119	53	156	160	170	78	51	86	33	49
29	.....	.....	113	177	150	630	322	177	51	83	29	45
30	.....	.....	91	192	.....	361	651	105	57	83	41	41
31	.....	.....	150	150	.....	229	.....	86	.....	67	37	.....

Daily discharge, in second-feet, of Doe River at Blevins, Tenn., for the years ending Sept. 30, 1912–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	33	29	91	86	96	204	177	153	160	51	31	51
2	29	29	88	73	91	150	163	131	137	55	110	41
3	29	28	61	83	96	134	150	119	128	91	93	41
4	29	29	61	80	105	119	143	110	150	80	61	57
5	26	25	71	78	110	119	125	105	137	59	37	51
6	26	26	71	91	116	116	116	108	128	51	33	45
7	26	279	61	99	113	119	113	108	181	49	216	41
8	26	108	61	91	113	122	119	134	238	45	160	37
9	26	78	43	78	119	86	119	102	208	41	88	41
10	25	57	47	80	122	143	105	91	150	41	73	37
11	26	51	45	71	134	116	131	91	113	39	61	31
12	24	45	35	96	86	113	212	88	108	73	53	33
13	26	49	28	91	71	134	270	88	99	61	41	33
14	47	59	21	96	75	1,270	303	86	86	53	67	35
15	45	49	19	91	78	1,210	260	83	80	39	49	37
16	26	43	16	80	67	543	260	91	73	41	51	41
17	26	41	18	86	78	270	247	128	75	59	41	37
18	26	43	35	93	73	204	196	108	86	45	45	61
19	39	41	45	91	73	167	167	96	80	31	41	57
20	29	33	45	91	99	167	150	88	71	41	41	49
21	21	37	45	93	91	342	128	91	61	35	39	69
22	26	37	41	105	86	196	122	91	69	31	55	88
23	33	35	49	96	78	167	119	265	67	31	99	61
24	22	29	45	105	80	150	116	517	61	41	59	57
25	26	29	43	181	75	143	105	270	57	61	41	51
26	26	33	45	134	78	185	105	342	53	59	41	47
27	25	37	71	177	342	1,540	146	416	49	51	39	43
28	24	37	49	318	318	581	177	376	51	43	33	41
29	26	29	71	247	.....	318	167	274	53	41	31	39
30	24	53	177	128	.....	270	160	225	51	37	99	73
31	26	.....	86	125	.....	185	.....	192	.....	31	73	.....
1913–14.												
1	41	55	102	78	225	108	208	108	53	20	45	64
2	43	55	83	73	163	80	208	93	51	71	41	55
3	41	53	64	71	137	110	173	91	47	55	35	45
4	39	53	61	110	122	137	150	91	47	37	41	45
5	35	53	61	78	110	108	137	137	49	31	37	43
6	35	51	59	71	200	122	131	137	86	28	35	43
7	35	49	146	67	322	116	116	134	69	26	35	45
8	37	53	131	102	238	102	122	131	47	26	39	49
9	37	110	119	93	137	80	113	134	47	26	49	55
10	35	102	83	146	113	125	108	125	43	55	45	57
11	35	83	75	102	108	143	99	119	37	51	43	69
12	39	83	71	71	105	471	99	119	35	45	43	78
13	35	80	64	83	105	251	102	108	45	33	51	57
14	33	83	59	110	108	200	108	93	55	31	55	49
15	29	83	59	91	113	170	421	88	45	67	75	35
16	31	119	59	116	116	170	342	80	35	59	55	35
17	35	156	57	78	108	167	251	80	33	73	45	21
18	35	119	53	71	122	153	208	80	102	67	39	55
19	39	88	53	67	137	137	200	73	73	53	31	39
20	110	80	51	71	220	143	386	57	75	28	35	35
21	73	71	51	91	181	93	265	61	45	24	41	37
22	59	69	55	75	143	93	208	69	35	24	37	35
23	59	67	55	80	150	99	177	67	35	25	24	24
24	73	61	67	91	156	113	163	69	31	26	26	22
25	102	59	78	150	143	110	137	69	35	26	26	35
26	88	59	83	134	140	128	96	64	29	31	86	35
27	78	59	71	108	113	153	163	59	26	35	212	20
28	73	57	67	102	113	185	140	57	26	67	270	24
29	71	53	67	91	.....	212	128	59	25	91	96	26
30	67	59	78	91	.....	294	119	57	21	67	73	33
31	59	.....	75	559	.....	204	.....	53	.....	55	67	.....

Daily discharge, in second-feet, of Doe River at Blevins, Tenn., for the years ending Sept. 30, 1912–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	31	51	416	143	196	113	105	91	167	102	.....	.....
2	33	53	466	146	426	93	116	105	185	86	.....	.....
3	35	45	308	137	318	96	102	150	119	67	.....	.....
4	31	45	381	125	255	105	91	185	91	140	.....	.....
5	26	43	517	105	204	119	99	185	91	313	.....	.....
6	25	43	279	134	200	150	116	192	78	116	.....	.....
7	25	45	212	366	173	140	143	270	80	88	.....	.....
8	24	45	192	260	153	134	150	185	78	78	.....	.....
9	22	99	160	177	128	91	150	150	67	75	.....	.....
10	18	78	134	137	119	105	134	150	67	71	.....	.....
11	21	73	119	108	116	119	167	134	64	71	.....	.....
12	26	73	113	255	119	91	204	128	59	86	.....	.....
13	35	67	150	216	116	96	167	134	78	108	.....	.....
14	55	71	185	192	119	105	150	119	80	86	.....	.....
15	51	83	150	192	150	105	167	105	78	75	.....	.....
16	294	119	.....	167	153	119	150	91	125	71	.....	.....
17	116	91	.....	185	134	105	119	105	96	67	.....	.....
18	108	55	.....	260	119	78	113	91	91	75	.....	.....
19	88	57	.....	313	110	91	105	88	78	71	.....	.....
20	71	.....	99	255	105	99	102	91	88	69	.....	.....
21	64	.....	108	204	105	96	96	88	78	88	.....	.....
22	55	.....	116	208	113	93	105	78	86	88	.....	.....
23	57	.....	119	185	105	91	91	91	67	78	.....	.....
24	57	.....	119	294	233	91	86	204	67	73	.....	.....
25	57	.....	581	294	170	99	80	119	61	69	.....	.....
26	61	73	517	238	146	113	86	105	61	67	.....	.....
27	59	78	279	212	134	134	86	91	57	67	.....	.....
28	55	80	225	185	119	91	204	91	53	61	.....	.....
29	49	91	225	146	.....	119	150	88	55	.....	.....	.....
30	45	143	212	150	.....	119	192	86	61	.....	.....	.....
31	45	.....	196	170	.....	116	.....	78	.....	.....	.....	.....

NOTE.—Discharge determined from a rating curve well defined below but only an extension above 300 second-feet. Discharge, estimated because of ice, as follows: Jan. 11–20, 1913, 80 second-feet; Nov. 20–25, 1914, 55 second-feet; Dec. 16–19, 1914, 110 second-feet. Discharge Mar. 1–3, 1912, interpolated because gage was not read.

Monthly discharge of Doe River at Blevins, Tenn., for the years ending Sept. 30, 1912–1915.

[Drainage area, 62.2 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911–12.						
December 16–31	156	39	103	1.66	0.99	B.
January	192	.....	97.4	1.57	1.81	B.
February	332	71	131	2.11	2.28	B.
March	940	102	209	3.36	3.87	B.
April	651	75	170	2.73	3.05	A.
May	251	67	122	1.96	2.26	A.
June	150	47	70.2	1.13	1.26	A.
July	446	53	124	1.99	2.29	A.
August	80	29	49.1	.789	.91	A.
September	153	17	41.7	.670	.75	A.
1912–13.						
October	47	21	28.0	.450	.52	A.
November	279	25	49.9	.802	.89	A.
December	177	16	54.3	.873	1.01	A.
January	318	71	111	1.78	2.05	B.
February	342	67	109	1.75	1.82	B.
March	1,540	86	309	4.97	5.73	B.
April	303	105	162	2.60	2.90	A.
May	517	83	167	2.68	3.09	A.
June	238	49	102	1.64	1.83	A.
July	91	31	48.6	.781	.90	A.
August	216	31	64.5	1.04	1.20	A.
September	88	31	47.5	.764	.85	A.
The year	1,540	16	104	1.67	22.79	

Monthly discharge of Doe River at Blevins, Tenn., for the years ending Sept. 30, 1912–1915—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1913–14.						
October	110	29	51.6	0.830	0.96	A.
November	156	49	74.1	1.19	1.33	A.
December	146	51	72.8	1.17	1.35	A.
January	559	67	107	1.72	1.98	B.
February	322	105	148	2.38	2.48	B.
March	471	80	154	2.48	2.86	A.
April	421	96	176	2.83	3.16	A.
May	137	53	89.1	1.43	1.65	A.
June	102	21	46.1	.741	.83	A.
July	91	20	43.6	.701	.81	A.
August	270	24	59.1	.950	1.10	A.
September	78	20	42.2	.678	.76	A.
The year	559	20	88.2	1.42	19.27	
1914–15.						
October	294	18	56.1	.902	1.04	A.
November	143	43	67.7	1.09	1.22	A.
December	581	.....	226	3.63	4.18	B.
January	366	105	199	3.20	3.69	B.
February	426	105	162	2.60	2.71	B.
March	150	78	107	1.72	1.98	A.
April	204	80	128	2.06	2.30	A.
May	270	78	125	2.01	2.32	A.
June	185	53	83.5	1.34	1.50	A.
July 1–28	313	61	89.5	1.44	1.50	A.

DOE RIVER AT VALLEY FORGE, TENN.

LOCATION.—At Eastern Tennessee & Western North Carolina Railroad bridge at Valley Forge, Carter County, about 4 miles above mouth of river.

DRAINAGE AREA.—132 square miles.

RECORDS AVAILABLE.—December 11, 1911, to September 30, 1915.

GAGE.—Chain gage attached to bridge; read daily, morning and evening, to hundredths.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading at a section about 40 feet above the bridge. The current makes a decided angle with the bridge.

CHANNEL AND CONTROL.—Practically permanent. Point of zero flow, determined by leveling September 9, 1912, about gage height −0.1 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 3.3 feet at 7 a. m. December 26; minimum stage recorded, 0.90 foot at 6.30 a. m. November 24.

WINTER FLOW.—Ice may affect discharge relation for short periods during unusually severe winters.

Data inadequate for estimates of discharge.

The following discharge measurement was made by Mathers and Morgan:

October 15, 1914: Gage height, 1.09 feet; discharge, 63.2 second-feet.

Daily gage height, in feet, of Doe River at Valley Forge, Tenn., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.01	1.10	2.40	1.80	1.75	1.60	1.60	1.58	1.63	.....	1.22	1.37
2	.99	1.10	2.40	1.75	2.65	1.50	1.60	1.53	1.53	.....	1.45	1.27
3	1.01	1.08	2.20	1.60	2.40	1.55	1.58	1.56	1.60	1.23	1.17	1.25
4	1.01	1.08	2.20	1.62	2.15	1.50	1.52	1.88	1.48	1.40	1.22	1.27
5	1.01	1.05	3.05	1.58	2.02	1.55	1.55	1.80	1.40	1.80	1.17	2.72
6	1.01	1.05	2.30	1.60	1.98	1.70	1.55	1.68	1.38	1.68	1.12	2.22
7	1.06	1.05	2.00	2.32	1.88	1.60	1.70	1.68	1.36	1.43	1.07	1.85
8	1.01	1.05	1.95	1.98	1.78	1.45	1.80	2.13	1.43	1.33	1.07	1.67
9	.99	1.45	1.80	1.82	1.65	1.35	1.75	1.96	1.33	1.48	1.07	1.52
10	.99	1.18	1.72	1.70	1.50	1.55	1.75	1.78	1.28	1.33	1.07	1.57
11	.99	1.10	1.58	1.70	1.60	1.58	1.70	1.70	1.26	1.43	1.12	1.42
12	.96	1.10	1.55	2.25	1.62	1.55	2.05	1.66	1.33	1.33	1.29	1.37
13	.96	1.05	1.50	2.00	1.60	1.50	1.85	1.66	1.28	1.63	1.92	1.57
14	1.11	1.05	1.60	1.85	1.60	1.50	1.75	1.58	1.40	1.43	1.32	1.42
15	1.09	1.15	1.15	2.18	1.65	1.48	1.68	1.56	1.36	1.29	1.22	1.35
16	2.42	1.25	1.20	2.15	1.80	1.48	1.60	1.58	1.73	1.27	1.22	1.32
17	1.52	1.30	1.12	2.10	1.60	1.50	1.58	1.48	1.46	1.25	1.15	1.27
18	3.12	1.15	1.32	2.40	1.62	1.42	1.50	1.48	1.40	1.59	1.47	1.29
19	1.40	1.25	1.42	2.35	1.60	1.52	1.48	1.40	1.33	1.52	1.95	1.27
20	1.30	1.15	1.75	2.15	1.58	1.50	1.46	1.48	1.28	1.37	2.07	1.22
21	1.22	1.02	1.70	1.90	1.55	1.50	1.40	1.33	1.38	2.02	1.67	1.32
22	1.20	1.15	1.75	1.68	1.55	1.50	1.43	1.28	1.46	1.59	1.47	1.29
23	1.18	1.18	1.58	1.85	1.52	1.42	1.40	1.48	1.28	1.47	1.37	1.22
24	1.20	.90	1.62	2.05	1.98	1.48	1.43	2.08	1.23	1.39	1.29	1.19
25	1.10	1.10	2.90	2.15	1.80	1.55	1.38	1.58	1.28	1.32	1.25	1.17
26	1.15	1.20	3.30	2.05	1.70	1.70	1.38	1.43	1.20	1.27	1.22	1.15
27	1.15	1.22	2.38	1.95	1.65	1.78	1.36	1.40	1.18	1.25	1.17	1.12
28	1.10	1.25	2.10	1.90	1.62	1.70	1.43	1.38	1.16	1.22	1.69	1.12
29	1.10	1.25	2.05	1.45	.....	1.68	1.78	1.36	1.16	1.17	1.57	1.17
30	1.10	2.02	2.20	1.72	.....	1.64	1.88	1.33	1.18	1.15	1.42	1.22
31	1.08	.....	1.95	1.70	.....	1.60	.....	1.28	.....	1.12	1.37	.....

NOTE.—Discharge relation probably affected by ice Nov. 19–23 and Dec. 16–20.

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

LOCATION.—At footbridge near Southern Railway station at Judson, Swain County.

DRAINAGE AREA.—668 square miles [1] (measured on United States Geological Survey topographic maps by the Knoxville Power Co.).

RECORDS AVAILABLE.—April 16, 1912, to September 30, 1915; June 25, 1896, to September 30, 1913, at old station of Geological Survey at Southern Railway bridge.

GAGE.—Friez water-stage recorder about 500 feet below footbridge.

DISCHARGE MEASUREMENTS.—Made from footbridge.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage during year, 23.5 feet December 4 (discharge, 9,690 second-feet); minimum stage, 17.1 feet October 1 and 2 (discharge, 380 second-feet).

1896–1912 maximum stage record (old United States Geological Survey station) 13.92 feet December 29, 1901 (discharge, 57,500 second-feet); minimum stage recorded, 2.10 feet October 13 to November 1 and December 20, 1904 (discharge, 275 second-feet).

1913–1915 maximum mean daily stage (Knoxville Power Co.'s station): 26.0 feet March 27, 1913 (discharge, 14,300 second-feet); minimum mean daily stage, 17.1 feet September 17, October 1 and 2, 1914 (discharge, 380 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

COOPERATION.—Estimates of daily discharge furnished by the Knoxville Power Co., Alcoa, Tenn.

[1] Supersedes area published in previous reports.

Daily discharge, in second-feet, of Little Tennessee River at Judson, N. C., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	380	621	4,836	2,504	6,201	2,064	1,576	1,000	1,478	2,229	784	634
2	380	614	2,746	2,328	8,196	1,899	1,506	992	1,586	2,042	1,096	614
3	686	608	4,941	2,130	5,298	1,823	1,478	985	1,288	1,576	868	595
4	985	595	9,691	2,031	3,874	1,760	1,412	978	1,120	1,440	854	602
5	660	583	7,671	1,910	3,614	2,999	1,374	918	1,024	2,834	728	1,686
6	553	571	4,420	2,614	3,874	3,098	1,364	903	1,032	2,449	680	1,440
7	506	577	3,166	4,226	3,250	2,592	1,354	2,009	1,064	1,802	654	896
8	468	608	2,636	2,977	2,988	2,328	1,326	3,054	1,040	1,556	654	770
9	448	992	2,284	2,526	2,768	2,130	1,298	1,932	948	1,556	680	693
10	419	735	2,053	2,251	2,603	2,031	1,261	1,576	889	1,459	686	647
11	468	640	1,844	2,207	2,482	1,932	1,383	1,383	868	1,666	680	647
12	463	614	1,676	3,412	2,372	1,834	1,488	2,042	962	1,288	728	640
13	428	595	1,739	2,878	2,262	1,760	1,307	2,581	940	1,207	749	756
14	453	589	1,844	2,548	2,185	1,708	1,243	1,954	1,000	1,163	700	1,120
15	3,710	1,234	1,516	2,471	3,154	1,656	1,207	1,718	1,392	1,497	770	889
16	5,676	2,020	1,497	2,251	3,065	1,760	1,172	1,516	1,497	1,354	707	728
17	2,614	1,234	1,497	2,856	2,603	1,676	1,138	1,402	1,243	1,112	660	680
18	1,877	1,000	1,497	3,790	2,416	1,576	1,104	1,307	1,146	1,024	660	654
19	1,497	910	1,345	5,256	2,251	1,576	1,088	1,252	985	1,016	819	634
20	1,252	854	1,556	3,790	2,130	1,616	1,072	1,225	925	970	1,163	621
21	1,112	763	1,823	3,054	2,042	1,576	1,064	1,163	903	1,016	1,207	1,146
22	992	805	1,781	2,724	1,998	1,516	1,048	1,129	868	903	1,000	861
23	910	784	1,556	2,944	2,064	1,468	1,048	1,146	812	962	819	666
24	840	742	1,636	4,420	3,373	1,430	1,032	1,234	770	940	798	647
25	819	721	8,343	4,920	2,802	1,421	1,072	1,129	770	854	784	614
26	763	707	8,831	3,774	2,416	1,440	1,040	1,163	770	826	784	595
27	714	700	6,306	3,214	2,240	1,516	1,008	1,252	770	798	798	583
28	680	700	5,676	2,911	2,108	1,478	1,024	1,198	962	777	819	583
29	673	1,402	4,521	2,658	.....	1,421	1,216	1,163	2,504	763	742	583
30	660	7,776	3,286	2,493	.....	1,546	1,040	1,056	3,190	749	647	854
31	634	.....	2,768	2,383	.....	1,596	.....	1,080	.....	735	634	.....

Monthly discharge of Little Tennessee River at Judson, N. C., for the year ending Sept. 30, 1915.

[Drainage area, 668 square miles.a]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	5,680	380	1,060	1.59	1.83
November	7,780	571	1,040	1.56	1.74
December	9,690	1,340	3,450	5.16	5.95
January	5,260	1,910	2,980	4.46	5.14
February	8,200	2,000	3,090	4.63	4.82
March	3,100	1,420	1,810	2.71	3.12
April	1,580	1,010	1,220	1.83	2.04
May	3,050	903	1,400	2.10	2.42
June	3,190	770	1,160	1.74	1.94
July	2,830	735	1,310	1.96	2.26
August	1,210	634	786	1.18	1.36
September	1,690	583	769	1.15	1.28
The year	9,690	380	1,670	2.50	33.90

a Supersedes area published in previous reports.

TUCKASEGEE RIVER AT BRYSON, N. C.

LOCATION.—At highway bridge in the town of Bryson, Swain County, half a mile below the mouth of Deep Creek and about 15 miles above the junction of Tuckasegee River with Little Tennessee River.

DRAINAGE AREA.—673 square miles.[1] (Measured on U. S. G. S. topographic maps by the Knoxville Power Co.).

[1] Supersedes area published in previous reports.

RECORDS AVAILABLE.—November 7, 1897, to September 30, 1915.

GAGE.—Friez water-stage recorder, installed February 3, 1914, by the Knoxville Power Co., about 200 feet below bridge to which old staff gage of Geological Survey was attached; vertical staff gage attached to the right-bank bridge pier used prior to installation of Friez gage.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Channel probably changes slightly after each flood, but conditions quickly become normal. Control consists of boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage during year, 5.36 feet (at Friez gage) December 25 (discharge, 7,250 second-feet); minimum mean daily stage, 0.96 foot (at Friez gage), October 1 and 2 (discharge, 346 second-feet).

1898–1915: Maximum stage recorded, 11.0 feet (old Geological Survey gage), March 19, 1899 (discharge, 38,600 second-feet); minimum stage recorded, 1.0 foot September 22 to 30, October 1 to 7, 15 to 19, 30 and 31, November 1, 2, and 9 to 19, 1899 (discharge 300 second-feet); a stage of 0.9 foot was recorded August 25, 1902; because of a shift in the control the discharge for this stage was also 300 second-feet.

WINTER FLOW.—Discharge relation not affected by ice.

COOPERATION.—Estimates of daily discharge furnished by the Knoxville Power Co., Alcoa, Tenn.

No discharge measurements were made during the year, but a measurement made on October 20, 1915 (gage height, 2.28 feet; discharge, 2,010 second-feet) checks the rating curve used for the year ending September 30, 1915.

Daily discharge, in second-feet, of Tuckasegee River at Bryson, N. C., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	346	543	2,827	2,168	4,680	1,732	1,293	1,044	1,866	2,217	966	710
2	346	543	2,283	1,958	6,550	1,688	1,254	1,018	1,974	2,119	1,122	678
3	606	543	3,031	1,790	5,190	1,646	1,214	1,031	1,632	1,746	940	657
4	767	533	6,057	1,688	3,915	1,576	1,161	1,031	1,346	1,717	1,044	678
5	574	522	4,459	1,604	3,575	2,657	1,175	940	1,241	2,725	851	1,896
6	513	512	3,048	3,235	3,745	2,555	1,188	902	1,214	2,334	790	1,467
7	491	501	2,368	4,153	3,014	2,284	1,280	2,640	1,214	1,866	755	1,005
8	439	512	2,135	2,759	2,742	1,958	1,427	3,235	1,280	1,660	755	876
9	387	927	1,881	2,351	2,487	1,805	1,521	1,943	1,096	1,576	802	814
10	366	657	1,660	2,086	2,334	1,746	1,360	1,604	992	1,660	839	779
11	366	553	1,563	2,070	2,168	1,674	2,022	1,440	966	1,660	755	802
12	387	533	1,454	3,473	2,086	1,628	2,054	1,866	1,005	1,373	876	779
13	387	512	1,387	2,640	1,974	1,563	1,576	1,850	1,161	1,440	1,109	902
14	429	616	1,360	2,351	1,927	1,508	1,440	1,481	1,135	1,333	876	1,005
15	5,275	1,481	1,360	2,368	2,895	1,467	1,346	1,346	1,400	1,508	1,005	790
16	4,765	1,280	1,333	2,119	2,589	1,521	1,280	1,267	1,400	1,387	767	733
17	1,866	914	1,333	3,133	2,168	1,440	1,227	1,333	1,241	1,214	721	699
18	1,427	767	1,320	4,459	2,022	1,373	1,175	1,201	1,135	1,201	889	699
19	1,175	689	1,320	4,595	1,912	1,387	1,135	1,400	1,005	1,333	1,135	678
20	1,055	678	1,688	3,422	1,805	1,387	1,096	1,254	953	1,201	1,563	647
21	979	605	3,677	2,861	1,732	1,346	1,083	1,148	1,005	1,201	1,467	1,267
22	851	553	3,626	2,572	1,703	1,346	1,070	1,135	979	1,070	1,070	814
23	802	605	3,167	2,844	1,896	1,293	1,044	1,135	876	1,096	914	647
24	767	533	3,286	4,085	3,575	1,267	1,070	1,267	814	1,005	839	618
25	767	522	7,247	4,425	2,385	1,280	1,122	1,083	851	940	814	595
26	710	522	5,887	3,507	1,990	1,293	1,057	1,267	839	914	755	595
27	647	522	3,847	3,031	1,820	1,360	1,070	1,122	814	902	790	616
28	616	522	2,980	2,725	1,674	1,307	1,227	1,400	966	889	940	616
29	616	1,214	3,235	2,402	.....	1,227	1,387	1,307	3,235	876	790	678
30	616	6,567	3,082	2,217	.....	1,254	1,122	1,161	3,201	864	755	1,175
31	616	.....	2,504	2,103	.....	1,346	.....	1,175	.....	826	733	.....

Monthly discharge of Tuckasegee River at Bryson, N. C., for the year ending Sept. 30, 1915.

[Drainage area, 673 square miles.[a]]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
October	5,280	346	999	1.48	1.71
November	6,570	501	866	1.29	1.44
December	7,250	1,320	2,790	4.15	4.78
January	4,600	1,600	2,810	4.18	4.82
February	6,550	1,670	2,730	4.06	4.23
March	2,660	1,230	1,580	2.35	2.71
April	2,050	1,040	1,280	1.90	2.12
May	3,240	902	1,390	2.07	2.39
June	3,240	814	1,290	1.92	2.14
July	2,720	826	1,410	2.10	2.42
August	1,560	721	917	1.36	1.57
September	1,900	595	830	1.23	1.37
The year	7,250	346	1,570	2.33	31.70

[1] Supersedes area published in previous reports.

HIWASSEE RIVER AT MURPHY, N. C.

LOCATION.—At highway bridge near the Louisville & Nashville Railroad station at Murphy, Cherokee County, half a mile above mouth of Valley River.

DRAINAGE AREA.—410 square miles.

RECORDS AVAILABLE.—June 26, 1896, to August 8, 1897; October 19, 1897, to September 30, 1915.

GAGE.—Chain gage attached to downstream side of bridge; read once daily, to half-tenths, by Miss Willie Mingus.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Channel consists of rock and gravel. Control is less permanent than the channel at measuring section, at which the bottom is rough and rocky.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.05 feet at 7 a. m. December 26 (discharge, 5,860 second-feet); minimum stage recorded, 4.9 feet at 7 a. m. October 1 and 2 (discharge, 185 second-feet).

1896–1915: 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).

WINTER FLOW.—Discharge relation not affected by ice.

REGULATION.—The few small mill dams on the stream are so far upstream that diurnal fluctuation is practically nil.

ACCURACY.—Records good.

The following discharge measurement was made by Warren E Hall:

November 6, 1914: Gage height, 4.99 feet; discharge, 224 second-feet.

Daily discharge, in second-feet, of Hiwassee River at Murphy, N. C., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	185	255	2,000	1,210	1,420	1,110	805	495	765	530	280	335
2	185	255	1,210	1,110	3,900	975	765	495	1,580	888	645	280
3	280	255	1,110	975	2,580	930	765	460	530	495	308	255
4	460	255	4,700	930	1,810	888	725	460	495	495	365	280
5	280	255	5,120	888	1,700	1,160	685	460	460	1,700	280	395
6	255	230	2,420	930	1,810	1,420	685	460	495	1,210	280	605
7	230	230	1,700	2,000	1,530	1,260	685	495	530	805	255	395
8	208	230	1,360	1,420	1,420	1,160	645	2,270	1,210	645	255	335
9	208	645	1,110	1,210	1,310	1,060	645	1,110	530	805	280	308
10	208	308	1,020	1,060	1,210	1,020	645	888	460	568	280	280
11	308	280	888	1,020	1,110	930	605	765	428	805	280	530
12	230	255	805	1,750	1,060	845	805	845	428	568	280	280
13	208	365	765	1,310	1,020	845	605	1,060	568	530	308	255
14	208	255	888	1,110	1,020	845	605	845	568	530	308	395
15	308	280	725	1,260	1,420	805	605	765	568	805	495	365
16	2,580	1,060	645	1,060	1,530	845	568	685	805	685	280	308
17	930	605	765	1,210	1,310	888	568	605	765	495	280	280
18	645	460	605	1,750	1,210	845	530	568	685	428	308	280
19	530	395	605	2,580	1,060	805	530	530	530	395	495	280
20	460	395	685	1,870	1,020	845	530	530	460	395	888	365
21	395	335	765	1,530	975	845	530	530	460	428	495	605
22	365	335	725	1,310	930	805	530	530	428	365	395	395
23	335	335	645	1,210	930	805	530	530	395	365	308	280
24	335	308	685	2,000	1,810	765	495	605	365	428	280	280
25	308	280	5,330	2,270	1,420	765	530	765	365	335	605	255
26	308	280	5,750	1,870	1,260	765	530	805	365	335	308	255
27	280	280	2,580	1,580	1,110	765	495	530	335	335	280	230
28	280	280	1,810	1,420	1,060	765	530	725	605	308	568	230
29	280	308	1,530	1,210	.....	765	845	530	495	308	845	230
30	280	5,330	1,640	1,160	.....	725	530	460	495	308	335	255
31	255	.....	1,360	1,060	.....	930	.....	605	.....	280	308	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 185 and 3,700 second-feet.

Monthly discharge of Hiwassee River at Murphy, N. C., for the year ending Sept. 30, 1915.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	2,580	185	398	0.971	1.12	B.
November	5,330	230	511	1.25	1.40	B.
December	5,750	605	1,680	4.10	4.73	B.
January	2,580	888	1,400	3.41	3.93	A.
February	3,900	930	1,430	3.49	3.63	A.
March	1,420	725	909	2.22	2.56	A
April	845	495	618	1.51	1.68	A.
May	2,270	460	691	1.69	1.95	B.
June	1,580	335	572	1.40	1.56	A.
July	1,700	280	567	1.38	1.59	A.
August	888	255	383	.934	1.08	A.
September	605	230	327	.798	.89	A.
The year	5,750	185	787	1.92	26.12	

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 from Murphy, N. C. Station is half a mile above Rodgers Creek and 1 mile below Colvards Creek.

DRAINAGE AREA.—120 square miles.

RECORDS AVAILABLE.—June 29, 1904, to December 31, 1909; January 21, 1914, to September 30, 1915.

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 rod bolted to timber on old bridge pier; this is the same gage which was in use when station was discontinued in 1909. Gage read twice daily by J. T. Hayes.

DISCHARGE MEASUREMENTS.—Made from new single-span steel bridge over site of old footbridge.

CHANNEL AND CONTROL.—Gravel bottom overlying bedrock. Control formed by gravel bar immediately below gage. This bar shifts after every flood of any magnitude.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.0 feet at 4 p. m. December 25 (discharge, 4,890 second-feet); minimum stage recorded, 0.9 foot at 7 a. m. and 6 p. m. October 1 (discharge, 45 second-feet).

1904–1909 and 1914–15: Maximum stage recorded, 17.3 feet November 19, 1906 (discharge, 10,400 second-feet); minimum stage recorded, 0.7 foot October 28 to November 2, 1904 (discharge, 22 second-feet).

WINTER FLOW.—Discharge relation seldom affected by ice.

ACCURACY.—Records rather poor, due to changeable control.

The following discharge measurement was made by Warren E. Hall:

November 6, 1914: Gage height, 1.08 feet; discharge, 63 second-feet.

Daily discharge, in second-feet, of Valley River at Tomotla, N. C., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	45	65	214	406	1,650	245	214	116	136	90	82	90
2	78	65	157	348	1,340	245	214	98	126	126	82	75
3	132	65	373	312	875	230	214	136	116	107	68	56
4	60	65	1,520	295	651	985	214	126	98	116	68	62
5	54	65	1,100	245	587	768	200	116	98	930	68	98
6	54	65	434	505	526	587	185	116	98	312	68	90
7	54	65	325	651	445	526	185	116	98	185	68	75
8	54	72	290	485	425	406	185	768	98	172	68	68
9	54	132	246	406	348	348	185	445	98	148	68	68
10	85	204	235	330	330	312	185	348	82	245	68	68
11	72	107	214	330	312	312	185	245	82	230	68	68
12	54	85	257	445	278	262	386	262	82	136	68	56
13	54	85	279	406	278	245	185	230	82	126	75	68
14	65	85	214	348	262	245	185	214	126	107	82	56
15	830	78	194	367	330	214	159	172	367	172	68	56
16	447	78	175	330	406	295	159	159	172	159	68	56
17	204	78	157	526	367	245	148	172	107	116	62	51
18	184	78	148	505	312	214	136	148	126	148	62	46
19	140	100	157	485	278	214	136	136	98	98	90	46
20	115	92	224	445	278	214	136	107	98	148	136	51
21	107	85	166	367	262	214	136	107	90	116	75	485
22	100	78	175	348	245	230	136	107	82	82	68	90
23	92	78	194	367	278	214	136	107	75	82	68	75
24	78	78	235	1,340	546	214	116	126	68	90	68	68
25	78	78	3,910	1,100	425	214	116	116	68	82	62	62
26	78	78	2,070	768	367	185	116	136	68	68	56	56
27	78	78	1,010	587	330	214	148	98	68	68	68	56
28	72	85	397	485	262	200	214	107	98	68	107	56
29	65	175	500	406	.....	185	159	107	98	68	82	56
30	65	257	410	348	.....	245	159	107	90	68	75	126
31	65	.....	302	348	.....	278	.....	116	.....	68	68	.....

NOTE.—Discharge determined as follows: Oct. 1 to Dec. 31, from a rating curve well defined below 500 second-feet; Jan. 1 to Sept. 30, from a rating curve fairly well defined between 100 and 500 second-feet; above 500 second-feet the curve is simply an extension. See "Accuracy" in station description.

Monthly discharge of Valley River at Tomotla, N. C., for the year ending Sept. 30, 1915.

[Drainage area, 120 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	830	45	120	1.00	1.15	B.
November	257	65	93.3	.778	.87	B.
December	3,910	148	525	4.38	5.05	D.
January	1,340	245	472	3.93	4.53	D.
February	1,650	245	464	3.87	4.03	D.
March	985	185	307	2.56	2.95	C.
April	386	116	174	1.45	1.62	B.
May	768	98	176	1.47	1.70	B.
June	367	68	106	.883	.99	B.
July	930	68	153	1.28	1.48	B.
August	136	56	73.7	.614	.71	C.
September	485	46	81.1	.676	.75	C.
The year	3,910	45	228	1.90	25.83	

NOTTELY RIVER NEAR RANGER, N. C.

LOCATION.—About one-half mile downstream from Ranger, Cherokee County, which is on Louisville & Nashville Railroad 7½ miles from Murphy, N. C.; 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, 1915.

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.

DISCHARGE MEASUREMENTS.—Made from downstream side of steel highway bridge on road from Ranger to Murphy, N. C.

CHANNEL AND CONTROL.—Channel is permanent, composed of bowlders, gravel, and sand; section is poor and uneven and current somewhat erratic, necessitating careful measurements. Right bank high; left bank overflows beyond bridge end at stages above 18 feet. Control is formed by a low shoal about 300 feet downstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.4 feet at 6 a. m. December 4 (discharge, 4,180 second-feet); minimum stage recorded, 2.1 feet at 6 a. m. October 1 to 4 (discharge, 89 second-feet).

1901–1905 and 1914–15: Maximum stage recorded, 21 feet February 28, 1902. (discharge, 5,660 second-feet); 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).

WINTER FLOW.—Discharge relation not affected by ice.

ACCURACY.—Results only fair, because of the difficulty of making good discharge measurements, due to poor measuring section.

The following discharge measurement was made by Warren E. Hall:

November 7, 1914: Gage height, 2.41 feet; discharge, 144 second-feet.

Daily discharge, in second-feet, of Nottely River near Ranger, N. C., for the year ending Sept. 30, 1915.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	89	143	1,230	524	1,980	653	437	310	437	410	223	192
2	89	143	524	524	1,380	587	437	310	359	384	202	182
3	89	143	1,080	524	1,310	555	437	287	310	359	182	182
4	89	143	4,180	524	862	524	437	287	265	265	202	162
5	143	143	2,300	494	862	862	410	265	265	653	182	265
6	143	143	1,230	494	862	524	410	265	265	524	182	223
7	124	143	862	1,230	862	790	384	265	359	359	192	182
8	124	143	971	862	721	721	384	1,230	465	310	162	192
9	106	143	524	524	653	620	359	790	359	310	162	182
10	89	143	465	524	587	587	359	687	265	465	162	172
11	143	162	437	494	587	555	359	587	265	524	202	162
12	124	162	384	494	587	524	359	587	265	359	182	162
13	124	162	494	465	524	524	359	653	359	265	182	182
14	106	162	494	465	524	524	334	587	359	265	202	265
15	2,980	524	465	437	265	524	334	524	524	265	182	202
16	1,620	265	437	410	862	524	334	410	465	265	182	182
17	359	265	410	310	721	524	334	359	265	244	182	182
18	310	265	384	265	587	494	334	359	687	223	182	162
19	287	244	384	1,620	587	494	334	334	310	223	192	162
20	265	223	384	1,230	587	494	334	310	265	223	162	223
21	244	202	384	862	524	494	334	310	265	223	202	244
22	202	182	359	826	524	465	334	310	244	212	192	202
23	182	162	359	755	524	465	334	287	244	202	182	172
24	182	162	437	1,540	1,120	465	334	287	223	202	202	182
25	162	152	2,980	1,380	862	465	334	287	223	202	182	182
26	162	143	1,620	862	721	437	334	287	223	202	182	162
27	143	143	1,080	826	653	437	334	465	223	192	202	162
28	143	143	898	790	653	410	334	359	265	182	182	182
29	143	162	587	653	.....	410	310	310	310	182	182	223
30	143	3,780	524	524	.....	524	310	310	310	182	182	1,540
31	143	.....	524	524	.....	465	.....	465	.....	182	182	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 124 and 800 second-feet, but only an extension above 800 second-feet. Estimates above 800 second-feet should be used with caution. Discharge Oct. 15, Nov. 30, Dec. 4 and 25, when water was over gage, estimated from notes made by observer.

Monthly discharge of Nottely River near Ranger, N. C., for the year ending Sept. 30, 1915.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October	2,980	89	298	1.10	1.27	B.
November	3,780	143	303	1.11	1.24	B.
December	4,180	359	884	3.25	3.75	B.
January	1,620	265	708	2.60	3.00	B.
February	1,980	265	768	2.82	2.94	B.
March	862	410	537	1.97	2.27	B.
April	437	310	359	1.32	1.47	B.
May	1,230	265	422	1.55	1.79	B.
June	687	223	321	1.18	1.32	B.
July	653	182	292	1.07	1.23	B.
August	223	162	186	.684	.79	A.
September	1,540	162	236	.868	.97	B.
The year	4,180	89	442	1.62	22.04	

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, and about 4 miles northwest of Dial, Fannin County, about 12 miles by river above gaging station at Morganton.

DRAINAGE AREA.—175 square miles (measured by Tennessee Power Co).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1915.

GAGE.—Bristol water-stage 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 bowlders; fairly smooth. Left bank overflows at a stage of about 12 feet. Control is formed by the head of rapids just below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage recorded during year, 4.6 feet December 4 and 25 (discharge, 2,680 second-feet); minimum mean daily stage recorded, 0.55 foot October 13, 29, and 30 (discharge, 109 second-feet).

1913-1915: Maximum mean daily stage recorded, 6.6 feet March 14, 1913 (discharge, 5,140 second-feet); minimum mean daily stage recorded, 0.55 foot October 13, 29, and 30, 1914 (discharge, 109 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

REGULATION.—The operation of small mills above gage, may cause a slight diurnal fluctuation.

ACCURACY.—Records good.

COOPERATION.—Records of daily gage height and the results of discharge measurements have been furnished by the Tennessee Power Co.

Discharge measurements of Toccoa River near Dial, Ga., during the years ending Sept. 30, 1913 to 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1912-13.		*Feet.*	*Sec.-ft.*	1913-14.		*Feet.*	*Sec.-ft.*
Mar. 1	Engineers of Tennessee Power Co.	3.45	1,450	Oct. 15	Engineers of Tennessee Power Co.	0.72	145
Apr. 17	.....do.....	2.30	812	Nov. 20	.....do.....	.75	147
May 1	.....do.....	1.90	674	(a)	.....do.....	.75	160
6	.....do.....	1.80	526	Aug. 20	.....do.....	.80	169
11	.....do.....	1.70	547				
19	.....do.....	1.60	466	1914-15.			
23	.....do.....	5.00	3,200	Mar. 9	L. J. Hall b.....	2.27	729
24	.....do.....	2.70	1,020	19	Warren E. Hall and L. J. Hall.	2.02	612
June 16	.....do.....	1.50	462	26	L. J. Hall b.....	1.87	534
24	.....do.....	1.40	374	Apr. 1	.....do.....	1.80	527
28	.....do.....	1.40	326	20	.....do.....	1.53	371
July. 1	.....do.....	1.38	337	23	.....do.....	1.50	362
2	.....do.....	1.30	336	May 14	.....do.....	1.78	525
7	.....do.....	1.20	325	June 8	.....do.....	1.58	381
8	.....do.....	1.20	273	July 5	.....do.....	2.32	704
9	.....do.....	1.20	268	27	.....do.....	1.02	190
16	.....do.....	1.20	273	Aug. 19	Warren E. Hall and L. J. Hall.	1.05	215
17	.....do.....	1.20	271	26	L. J. Hall b.....	.89	176
19	.....do.....	1.10	235	31	.....do.....	.88	164
Aug. 21	.....do.....	.90	191	Sept. 18	.....do.....	.84	151
28	.....do.....	.80	161				
Sept. 24	.....do.....	.80	163				
30	.....do.....	1.38	350				

a Date not known; measurement probably made in November, 1913.
b Engineer of the Tennessee Power Co.

NOTE.—Measurements made during 1915 were made under the supervision of the U. S. Geological Survey.

Daily discharge, in second-feet, of Toccoa River near Dial, Ga., for the years ending Sept. 30, 1913–1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913.									
1	478	650	942	1,260	600	526	342	363	163
2	431	625	805	1,180	575	526	321	302	163
3	600	832	778	2,450	575	502	321	266	163
4	454	750	750	1,090	550	526	321	234	163
5	454	675	750	1,030	550	478	394	249	176
6	454	675	700	1,000	550	575	313	249	204
7	454	650	675	970	600	915	302	249	189
8	600	600	650	942	575	778	283	363	163
9	502	575	650	915	575	625	283	249	176
10	454	550	1,090	882	550	526	283	234	163
11	454	454	1,030	915	526	502	459	218	152
12	942	970	832	915	526	478	502	218	152
13	650	778	970	849	502	454	342	218	163
14	550	700	5,140	915	502	431	321	218	152
15	502	700	4,120	866	492	431	321	218	163
16	502	650	2,040	805	492	408	302	218	176
17	502	625	1,550	783	550	408	283	218	176
18	650	600	1,360	761	502	408	249	218	176
19	502	600	1,220	745	526	408	249	321	176
20	502	970	1,180	735	625	386	249	218	234
21	526	750	1,550	700	502	408	249	204	302
22	502	750	1,180	685	526	386	249	204	189
23	502	700	1,090	685	3,160	363	249	218	163
24	860	650	1,030	665	1,030	363	283	204	163
25	750	625	1,060	655	725	342	249	189	152
26	650	600	1,430	655	675	342	266	176	152
27	1,430	1,940	4,360	655	675	342	302	176	152
28	970	1,180	1,940	675	600	363	266	176	152
29	778	.....	1,590	650	550	386	249	189	408
30	700	.....	1,550	625	550	408	321	189	249
31	778	.....	1,550	.....	526	.....	249	163	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	204	163	431	283	302	302	478	408	249	140	140	176
2	176	163	249	249	283	234	431	431	234	140	152	176
3	163	163	204	266	283	218	386	431	234	140	176	152
4	152	163	189	249	266	234	342	454	234	189	204	130
5	152	163	176	218	249	266	342	526	249	176	163	140
6	152	163	234	218	550	283	342	454	321	152	152	140
7	152	163	363	218	408	302	408	408	283	140	130	140
8	152	249	204	234	266	234	526	408	283	140	140	140
9	152	189	176	249	266	218	363	363	266	176	321	140
10	152	163	176	234	302	266	342	363	218	176	454	119
11	152	152	163	176	283	408	386	386	204	204	342	130
12	152	152	163	163	283	478	386	386	204	176	204	152
13	152	152	176	163	342	342	431	363	189	163	189	130
14	140	152	176	163	342	321	1,260	342	189	189	234	119
15	140	163	176	189	283	302	860	321	189	234	234	119
16	140	176	176	189	266	302	675	321	189	321	204	119
17	140	176	176	176	266	298	575	302	189	321	189	119
18	152	163	163	163	363	306	575	302	218	302	176	130
19	302	152	163	189	600	298	778	283	189	218	176	189
20	218	152	189	189	526	294	805	283	204	189	163	163
21	176	152	163	176	363	321	650	283	189	176	163	140
22	163	152	163	152	363	302	600	283	189	163	176	140
23	163	152	266	152	431	283	575	283	176	163	152	130
24	408	152	218	204	342	302	575	283	176	163	152	119
25	454	152	321	204	302	302	550	266	163	163	176	119
26	408	152	266	176	302	363	526	249	163	163	163	140
27	386	152	218	163	283	408	502	249	163	163	152	130
28	431	152	218	163	302	431	478	249	163	234	204	130
29	342	152	363	176	.....	449	478	249	152	204	176	130
30	321	266	302	266	.....	478	431	283	140	152	163	140
31	302	.....	321	550	.....	478	.....	266	.....	152	140	.....

Daily discharge, in second-feet, of Toccoa River near Dial, Ga., for the years ending Sept. 30, 1913–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	130	152	756	581	2,340	739	500	345	394	322	261	173
2	140	152	640	545	1,420	706	505	330	341	420	211	171
3	454	152	1,150	520	1,110	690	505	330	304	304	191	158
4	249	152	2,680	495	1,010	674	481	326	294	318	189	181
5	176	152	1,360	515	1,080	980	471	308	315	653	173	500
6	168	149	942	1,110	980	865	485	312	330	424	168	280
7	163	140	810	843	920	854	485	1,140	333	337	163	206
8	161	152	695	680	865	766	476	782	364	385	166	181
9	152	218	625	612	804	739	466	505	304	402	181	168
10	130	163	560	576	772	733	457	424	284	352	194	161
11	140	152	512	696	744	712	461	402	287	341	242	151
12	119	152	488	739	744	685	457	520	308	287	223	173
13	109	140	595	617	739	674	411	565	304	322	208	208
14	140	158	492	612	782	664	402	471	360	330	200	232
15	942	329	426	601	1,310	659	394	438	373	394	186	163
16	750	294	422	565	980	701	377	402	330	312	173	144
17	386	204	413	920	860	674	373	381	411	248	181	144
18	302	181	408	1,220	799	606	360	360	360	235	235	144
19	266	173	399	1,220	739	612	352	352	315	245	211	151
20	234	171	464	920	717	601	341	345	294	248	220	168
21	234	158	468	755	690	565	337	341	287	238	270	341
22	234	163	431	810	701	550	333	402	274	220	197	194
23	204	161	413	950	980	530	330	360	257	217	178	171
24	189	161	585	1,250	1,280	530	352	356	251	211	173	146
25	189	161	2,680	1,110	950	530	349	349	254	206	194	144
26	189	163	1,010	950	843	530	349	341	251	200	171	144
27	140	163	794	860	804	535	352	312	251	197	197	144
28	130	168	706	782	788	510	360	308	287	194	211	144
29	109	816	865	766	.....	500	360	312	284	191	178	144
30	109	1,760	701	760	.....	520	345	337	322	191	181	352
31	156	.....	617	810	.....	505	.....	385	.....	194	171	.....

NOTE.—Discharge determined as follows: Jan. 1, 1913, to Dec. 25, 1914, from a rating curve fairly well defined between 120 and 4,000 second-feet; Dec. 26, 1914, to Sept. 30, 1915, from a rating curve well defined between 140 and 4,000 second-feet.

Monthly discharge of Toccoa River near Dial, Ga., for the years ending Sept. 30, 1913–1915.

[Drainage area, 175 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1913.						
January	1,430	431	616	3.52	4.06	B.
February	1,940	454	744	4.25	4.43	B.
March	5,140	650	1,470	8.40	9.68	B.
April	2,450	625	889	5.08	5.67	B.
May	3,160	492	660	3.77	4.35	B.
June	915	342	466	2.66	2.97	B.
July	502	249	302	1.73	1.99	B.
August	363	163	230	1.31	1.51	B.
September	408	152	184	1.05	1.17	B.
1913–14.						
October	454	140	221	1.26	1.45	B.
November	266	152	166	.949	1.06	B.
December	431	163	224	1.28	1.48	B.
January	550	152	212	1.21	1.40	B.
February	600	249	336	1.92	2.00	B.
March	478	218	323	1.85	2.13	B.
April	1,260	342	535	3.06	3.41	B.
May	526	249	338	1.93	2.22	B.
June	321	140	207	1.18	1.32	B.
July	321	140	187	1.07	1.23	B.
August	454	130	192	1.10	1.27	B.
September	189	119	138	.789	.88	B.
The year	1,260	119	256	1.46	19.85	

Monthly discharge of Toccoa River near Dial, Ga., for the years ending Sept. 30, 1913–1915—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914–15.						
October	942	109	232	1.33	1.53	B.
November	1,760	140	247	1.41	1.57	C.
December	2,680	399	778	4.45	5.13	C.
January	1,250	495	787	4.50	5.19	B.
February	2,340	690	955	5.46	5.69	B.
March	980	500	650	3.71	4.28	A.
April	505	330	408	2.33	2.60	A.
May	1,140	308	414	2.37	2.73	B.
June	411	251	311	1.78	1.99	A.
July	653	191	295	1.69	1.95	B.
August	270	163	197	1.13	1.30	A.
September	500	144	193	1.10	1.23	A.
The year	2,680	109	453	2.59	35.19	

TOCCOA RIVER NEAR MORGANTON, GA.

LOCATION.—At Morganton Bridge, about 2 miles west of Morganton post office, Fannin County, and 4 miles east of Blueridge, Ga. Star creek enters half a mile above and Hemptown Creek about 3 miles below station.

DRAINAGE AREA.—231 square miles (measured by Tennesse Power Co.).

RECORDS AVAILABLE.—November 25, 1898, to March 31, 1903, and April 1, 1913, to September 30, 1915. Records from 1898 to 1903 published in Water-Supply Paper 197 under "Toccoa River near Blueridge, Ga."

GAGE.—Bristol water-stage recorder on right bank about 200 feet below bridge and about 150 feet downstream from the old vertical staff, which was used from 1898 to 1903; zero of both gages is 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. Date of installation of the water-stage recorder is not known, but it was probably some time in 1914. The gage-height record prior to the use of the water-stage recorder was referred to old staff gage.

DISCHARGE MEASUREMENTS.—Made from cable about 1,800 feet downstream from gage.

CHANNEL AND CONTROL.—Bed of stream fairly smooth; composed of gravel and boulders. Left bank overflows at a stage of about 15 feet. Control consists of gravel and boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage recorded during year, 6.22 feet December 4 (discharge, 2,990 second-feet); minimum mean daily stage recorded, 1.8 feet October 1 (discharge, 129 second-feet).

1913–1915: Maximum mean daily stage recorded, 7.75 feet May 23, 1913 (discharge, 4,210 second-feet); minimum mean daily stage recorded, 1.8 feet September 10, 14 to 17, 29, 30, and October 1, 1914 (discharge, 129 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

REGULATION.—Slight diurnal fluctuations may be caused by operation of small mills above station.

ACCURACY.—Records good.

COOPERATION.—Record of daily gage height and the results of discharge measurements furnished by the Tennessee Power Co.

Discharge measurement of Toccoa River near Morganton, Ga., during the years ending Sept. 30, 1913–1915.

Date.	Made by—	Gage height.	Discharge.
1912–13.		*Feet.*	*Sec.-ft.*
Apr. 2	Engineer of Tennessee Power Co	4.26	1,500
18	do	3.61	938
May 2	do	3.25	860
7	do	3.21	788
13	do	3.10	680
26	do	3.40	898
30	do	3.10	677
June 17	do	2.90	645
27	do	2.70	475
July 3	do	2.60	427
8	do	2.50	369
19	do	2.40	312
Aug. 26	do	2.15	206
30	do	2.25	244
Sept. 12	do	2.05	175
22	do	2.30	257
26	do	2.10	195
1913–14.			
Oct. 1	do	2.35	274
14	do	2.05	176
22	do	2.17	205
Nov. 5	do	2.12	189
10	do	2.22	219
12	do	2.15	206
Dec. 17	do	2.15	205
30	do	2.65	365
Feb. 20	do	2.95	531
Apr. 14	do	5.40	2,380
15	do	4.25	1,420
July 1	do	2.00	167
1913–14.			
July 3	Engineer of Tennessee Power Co	2.02	174
9	do	2.10	211
17	do	2.60	396
18	do	2.80	472
Aug. 21	do	2.09	205
1914–15.			
Jan. 20	do	4.00	1,180
22	do	3.60	897
25	do	4.48	1,470
Mar. 13	L. J. Hall	3.46	759
18	Warren E. Hall and L. J. Hall.	3.37	700
18	do	3.37	698
24	L. J. Hall	3.27	644
Apr. 2	do	3.16	574
19	do	2.94	461
24	do	2.90	452
May 13	do	3.48	786
22	do	2.82	397
June 7	do	2.84	390
July 2	do	3.08	483
23	do	2.52	261
23	do	2.52	262
Aug. 18	Warren E. Hall and L. J. Hall.	2.61	296
25	L. J. Hall	2.48	248
30	do	2.42	227
Sept. 6	do	2.76	375
17	do	2.33	207

NOTE.—Measurements on and after Mar. 13, 1915, were made under the supervision of the United States Geological Survey.

Daily discharge, in second-feet, of Toccoa River near Morganton, Ga., for the years ending Sept. 30, 1913–1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1913.													
1	1,600	876	745	508	480	206	16	1,140	682	564	400	301	221
2	1,560	810	1,010	480	508	206	17	1,080	876	564	374	280	221
3	1,560	810	1,010	426	400	191	18	1,110	682	564	349	258	221
4	1,460	810	876	426	349	191	19	1,010	682	564	325	426	221
5	1,420	810	810	426	301	240	20	976	843	564	325	349	349
6	1,350	810	810	453	325	221	21	942	682	622	325	280	622
7	1,320	843	942	400	325	221	22	942	745	593	301	258	280
8	1,280	876	1,420	374	480	240	23	909	4,210	564	301	258	221
9	1,240	876	876	349	426	240	24	876	2,210	536	301	240	206
10	1,210	876	778	349	325	206	25	876	1,280	508	349	221	191
11	1,210	843	714	564	301	191	26	876	942	453	349	206	191
12	1,210	810	682	714	301	191	27	876	942	453	374	206	191
13	1,180	745	682	536	258	206	28	876	876	508	400	191	191
14	1,140	745	682	480	325	206	29	876	876	508	349	191	426
15	1,140	714	622	426	374	206	30	876	778	622	508	240	652
							31	.....	745	.....	453	206	.....

Daily discharge, in second-feet, of Toccoa River near Morganton, Ga., for the years ending Sept. 30, 1913–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913-14.												
1	280	240	508	374	400	400	622	508	280	167	179	157
2	280	240	349	330	349	349	564	508	258	179	179	206
3	258	240	258	349	301	349	508	508	258	179	206	191
4	221	240	240	301	280	349	453	508	258	206	240	147
5	206	240	221	280	280	374	426	593	280	240	206	147
6	191	240	258	258	652	349	400	508	400	179	179	138
7	191	240	426	258	564	374	400	480	349	167	167	143
8	191	325	374	258	453	349	682	508	349	167	167	138
9	191	301	221	280	400	301	536	480	301	221	374	138
10	191	258	221	280	426	301	480	453	258	221	536	129
11	191	240	221	258	426	480	453	453	240	191	480	138
12	191	206	221	240	374	652	480	426	221	206	301	157
13	191	206	221	240	453	480	453	400	240	179	258	147
14	191	206	221	221	453	426	1,860	374	221	191	301	129
15	179	206	221	240	400	426	1,380	374	221	258	325	129
16	179	206	221	240	374	400	1,010	349	221	426	240	129
17	179	221	221	221	349	400	843	349	240	453	221	129
18	191	206	221	221	349	400	652	349	301	374	191	138
19	426	191	206	206	652	416	942	325	280	221	167	167
20	349	191	191	206	622	519	1,240	325	221	206	167	167
21	258	191	191	206	453	453	909	301	221	186	179	147
22	258	191	191	191	400	400	778	301	206	179	179	147
23	258	191	240	191	508	374	714	301	191	167	157	129
24	480	191	258	240	426	349	622	301	191	167	147	147
25	400	191	258	280	400	349	622	301	179	167	167	191
26	349	191	374	221	400	400	564	280	191	167	179	147
27	325	191	301	206	374	453	564	280	191	167	179	138
28	374	191	400	206	400	519	564	280	191	179	206	138
29	280	191	453	206	.....	536	593	280	179	325	206	129
30	258	221	400	258	.....	652	564	325	167	191	191	129
31	240	.....	400	652	.....	593	.....	301	.....	179	167	.....
1914-15.												
1	129	167	982	483	2,730	930	588	404	517	414	238	218
2	138	167	739	472	2,030	856	582	383	419	478	261	223
3	426	167	1,290	434	1,700	827	582	373	388	373	223	235
4	400	167	2,990	414	1,520	812	540	369	373	398	220	229
5	191	157	1,780	388	1,400	1,330	534	354	378	885	210	576
6	147	159	1,160	784	1,410	1,080	529	359	393	540	199	378
7	143	167	955	1,330	1,210	1,050	517	1,520	409	369	196	268
8	143	179	804	848	1,060	960	517	982	429	404	215	245
9	143	258	720	722	960	878	512	663	373	414	226	232
10	167	206	658	663	915	848	506	570	373	588	226	223
11	157	179	599	670	870	820	523	512	369	512	258	223
12	147	179	564	915	841	791	558	644	378	378	254	223
13	157	179	682	750	805	757	483	764	398	359	254	283
14	942	179	622	689	856	743	478	600	472	414	238	310
15	2,250	297	519	683	1,650	736	478	529	472	350	226	232
16	536	416	536	644	1,260	777	467	483	419	369	220	223
17	349	254	525	1,200	1,040	729	472	456	414	331	229	223
18	258	209	480	1,520	960	696	461	429	461	315	290	223
19	240	194	486	1,450	885	689	456	424	373	323	265	223
20	221	186	542	1,090	841	703	445	419	378	331	279	229
21	191	179	599	975	812	670	445	414	373	327	306	345
22	191	200	536	834	798	657	440	404	369	315	248	272
23	191	194	508	892	1,030	632	434	461	369	302	223	226
24	191	186	695	1,450	1,690	619	414	424	373	261	212	201
25	191	177	2,890	1,540	1,240	625	409	419	369	258	232	196
26	191	181	1,360	1,240	1,040	619	409	404	331	254	218	196
27	167	189	1,150	1,050	952	606	398	383	331	238	220	196
28	167	179	771	982	930	600	393	378	388	229	261	196
29	167	547	955	863	.....	594	398	378	354	226	229	196
30	167	2,270	1,040	856	.....	613	388	424	419	223	229	440
31	172	.....	707	952	.....	613	.....	512	.....	218	218	.....

NOTE.—Discharge determined as follows: Apr. 1, 1913, to Dec. 31, 1914, from a rating curve fairly well defined between 150 and 2,500 second-feet; Jan. 1 to Sept. 30, 1915, from a rating curve well defined between 180 and 2,500 second-feet.

Monthly discharge of Toccoa River near Morganton, Ga., for the years ending Sept. 30, 1913–1915.

[Drainage area, 231 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1913.						
April	1,600	876	1,140	4.94	5.51	B.
May	4,210	682	978	4.23	4.88	B.
June	1,420	453	695	3.01	3.36	B.
July	714	301	409	1.77	2.04	B.
August	508	191	309	1.34	1.54	B.
September	652	191	252	1.09	1.22	B.
1913–14.						
October	480	179	256	1.11	1.28	B.
November	325	191	219	.948	1.06	B.
December	508	191	281	1.22	1.41	B.
January	652	191	262	1.13	1.30	B.
February	652	280	426	1.84	1.92	B.
March	652	301	425	1.84	2.12	B.
April	1,860	400	696	3.01	3.36	B.
May	593	280	388	1.68	1.94	B.
June	406	167	243	1.05	1.17	B.
July	453	167	216	.935	1.08	B.
August	536	147	227	.983	1.13	B.
September	206	129	147	.636	.71	B.
The year	1,860	129	315	1.36	18.48	
1914–15.						
October	2,250	129	299	1.29	1.49	B.
November	2,270	157	279	1.21	1.35	B.
December	2,990	480	930	4.03	4.65	C.
January	1,540	388	896	3.88	4.47	B.
February	2,730	798	1,190	5.15	5.36	B.
March	1,330	594	770	3.33	3.84	A.
April	588	388	479	2.07	2.31	A.
May	1,520	354	511	2.21	2.55	A.
June	517	331	395	1.71	1.91	A.
July	885	218	368	1.59	1.83	B.
August	306	196	236	1.02	1.18	A.
September	576	196	256	1.11	1.24	A.
The year	2,990	129	548	2.37	32.18	

OCOEE RIVER AT EMF, TENN.

LOCATION.—About 600 feet below the Tennessee Power Co.'s plant No. 2, known as Caney Creek plant, at Emf, Polk County, about 1½ miles below mouth of Goforth Creek and 8 miles upstream from Parksville, Tenn.

DRAINAGE AREA.—530 square miles (measured by Tennessee Power Co.).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1915.

GAGE.—Bristol water-stage recorder on left bank about 500 feet below power plant.

DISCHARGE MEASUREMENTS.—Made from cable about 2,000 feet below gage; for a time measurements were made from a boat.

CHANNEL AND CONTROL.—Bed of stream at measuring section is sandy and shifting. Banks overflow during high stages. Control is a rocky shoal at the head of a small island about 700 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage recorded during year, 8.12 feet December 25 (discharge, 8,230 second-feet); minimum mean daily stage recorded, 2.79 feet October 1 (discharge, 294 second-feet).

1913–1915: Maximum mean daily stage recorded, 11.4 feet March 27, 1913 (discharge, 16,200 second-feet); minimum mean daily stage recorded, 2.77 feet September 15 to 17, 1914 (discharge, 285 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

REGULATION.—Diurnal fluctuations are caused by operation of power plants but the use of the water-stage recorder enables accurate determination of mean daily gage height.

ACCURACY.—Records good.

COOPERATION.—Records of daily gage height and the results of discharge measurements furnished by the Tennessee Power Co.

Discharge measurements of Ocoee River at Emf, Tenn., during the years ending Sept. 30, 1914 and 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
July 14	Engineers of Tennessee Power Co.	2.75	272	Feb. 12	Warren E. Hall	4.30	1,510
				Apr. 9	Warren E. Hall and L. J. Hall[a]	3.80	1,020
23	do	3.90	1,190				
24	do	3.60	858	May 27	do	3.63	940
25	do	3.45	686	July 15	do	3.50	779
Aug. 3	do	3.15	507	Aug. 11	L. J. Hall	3.22	546
7	do	3.32	622	Sept. 11	Warren E. Hall and L. J. Hall	3.05	434

[a] Engineer of the Tennessee Power Co.

NOTE.—Measurements during 1915 were made under the supervision of the United States Geological Survey.

Daily discharge, in second-feet, of Ocoee River at Emf, Tenn., for the years ending Sept. 30, 1913–1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913.									
1	1,240	2,450	3,000	2,320	1,450	1,190	1,000	1,560	402
2	1,240	2,190	3,000	2,320	1,240	1,290	990	1,100	397
3	1,930	2,320	2,720	2,320	1,240	1,380	816	833	386
4	1,450	2,320	2,720	2,320	1,240	1,320	765	650	380
5	1,240	2,190	2,720	2,320	1,240	1,140	859	597	397
6	1,930	2,190	2,450	2,320	1,240	1,320	782	590	420
7	1,450	2,190	2,450	2,320	1,240	1,610	706	666	450
8	1,240	1,930	2,450	2,320	1,450	3,100	681	868	402
9	1,240	1,930	2,320	2,320	1,400	2,050	681	1,370	420
10	1,240	1,800	2,720	2,320	1,340	1,570	666	642	526
11	1,240	2,450	2,450	2,320	1,240	1,340	877	576	299
12	1,800	4,780	2,450	2,320	1,240	1,240	1,450	540	386
13	1,560	2,320	2,450	2,060	1,140	1,140	1,050	520	386
14	1,560	2,060	14,000	2,060	1,140	1,120	824	627	391
15	1,450	1,930	6,370	2,060	1,090	1,040	757	642	402
16	1,450	1,930	4,250	2,060	1,090	1,040	740	612	438
17	1,240	1,930	3,590	1,930	1,310	980	698	561	438
18	1,240	1,930	2,450	1,800	1,140	940	673	507	604
19	1,240	1,930	2,450	1,800	1,040	1,090	642	488	488
20	1,240	1,930	2,450	1,800	1,620	990	619	658	462
21	1,240	2,450	5,740	1,800	1,090	940	604	561	681
22	1,340	1,930	3,910	1,800	1,140	1,020	597	514	627
23	1,450	1,930	2,720	1,800	6,590	970	590	514	444
24	1,680	1,930	2,580	1,680	3,590	895	604	488	414
25	3,290	1,930	2,450	1,680	2,060	850	673	426	397
26	2,190	1,930	2,450	1,680	1,580	895	868	450	391
27	4,780	8,870	16,200	1,680	1,480	877	1,130	432	462
28	3,140	6,810	3,910	1,680	1,460	877	1,040	432	391
29	2,450	.....	2,580	1,680	1,270	833	723	474	723
30	2,190	.....	2,580	1,560	1,220	1,040	757	494	1,450
31	2,450	.....	2,450	.....	1,140	.....	808	426	.....

Daily discharge, in second-feet, of Ocoee River at Emf, Tenn., for the years ending Sept. 30, 1913–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	681	444	980	940	1,100	799	1,340	980	520	331	310	336
2	526	488	980	782	782	731	1,200	922	500	369	299	397
3	444	462	650	868	635	689	1,090	816	488	331	397	650
4	414	462	514	689	561	689	990	886	627	331	774	420
5	408	456	500	681	604	689	904	1,210	554	414	850	331
6	408	462	488	658	1,470	765	842	1,140	526	408	438	294
7	402	462	990	619	1,680	740	816	931	774	320	383	289
8	391	650	940	627	1,090	689	1,090	980	740	331	336	294
9	391	650	740	604	904	681	1,230	877	612	331	824	331
10	374	554	612	612	774	642	960	824	568	386	922	310
11	374	474	500	554	850	681	877	774	533	397	895	289
12	391	456	462	627	757	1,280	922	723	650	336	597	320
13	369	432	450	540	774	1,210	904	731	922	341	426	331
14	358	426	456	507	1,090	494	3,540	706	520	456	568	299
15	358	426	561	494	931	833	3,290	673	488	658	500	285
16	369	420	488	488	790	842	2,140	658	474	850	426	285
17	363	450	432	520	790	765	1,620	642	408	1,920	391	285
18	397	450	462	474	731	774	1,320	650	782	1,380	299	289
19	627	420	450	468	859	774	1,380	642	698	765	123	299
20	790	391	438	426	1,240	868	2,660	583	526	494	627	352
21	583	432	426	488	1,060	960	1,930	604	462	414	561	341
22	462	414	432	474	895	833	1,530	576	426	397	380	723
23	432	432	533	474	886	790	1,370	568	408	363	336	331
24	740	408	642	462	1,050	731	1,240	576	326	326	320	408
25	808	391	635	627	886	706	1,160	547	386	310	374	450
26	619	397	740	619	868	689	1,120	540	438	310	358	391
27	576	391	748	494	808	782	1,080	526	426	289	369	331
28	757	402	533	514	706	868	1,010	520	386	358	438	299
29	612	408	1,050	488	.....	895	1,050	507	341	514	500	310
30	561	426	1,180	468	.....	1,260	1,110	507	326	488	432	299
31	450	.....	886	774	.....	1,800	.....	547	.....	1,100	369	.....
1914–15.												
1	294	358	1,960	1,530	5,740	1,680	1,280	715	1,090	886	468	414
2	299	347	1,100	1,380	4,250	1,600	1,220	757	1,030	1,240	576	426
3	397	352	2,190	1,210	2,620	1,520	1,210	706	859	740	527	462
4	799	352	5,620	1,140	2,190	1,470	1,150	731	774	706	514	456
5	468	347	4,250	1,150	2,190	2,620	1,110	740	748	2,180	468	2,200
6	380	336	2,270	2,000	2,860	2,360	1,070	723	859	1,450	426	960
7	347	336	1,560	2,940	2,270	2,200	1,060	2,230	913	913	432	583
8	331	369	1,420	1,900	1,780	2,010	1,040	2,920	1,050	1,000	426	514
9	320	824	1,130	1,530	1,520	1,800	1,000	1,550	895	1,500	474	444
10	304	561	1,020	1,350	1,540	1,700	990	1,140	706	1,230	526	426
11	341	408	922	1,340	1,640	1,690	1,100	1,010	666	1,490	526	408
12	341	363	824	1,890	1,530	1,540	1,200	1,140	666	904	561	514
13	326	352	816	1,800	1,520	1,600	1,080	1,280	1,180	808	526	474
14	320	363	990	1,530	1,470	1,450	1,010	1,150	1,730	960	666	706
15	2,380	420	765	1,540	2,450	1,440	1,000	1,060	1,880	765	500	494
16	2,780	859	689	1,450	2,410	1,540	970	940	1,350	681	456	426
17	1,030	635	666	1,620	1,940	1,580	950	913	1,070	658	432	380
18	689	462	799	2,230	1,730	1,460	931	842	1,020	658	642	386
19	520	426	859	2,650	1,660	1,450	931	824	850	650	850	374
20	420	438	3,240	2,060	1,580	1,460	922	765	765	642	824	380
21	456	391	1,070	1,750	1,520	1,440	886	757	740	673	850	706
22	438	408	1,130	1,580	1,460	1,410	859	731	681	583	576	583
23	414	408	940	1,550	1,740	1,340	842	816	635	540	444	426
24	408	397	1,420	2,610	3,360	1,310	833	790	576	540	420	397
25	386	386	8,230	2,960	2,440	1,280	850	799	576	547	500	369
26	386	380	6,060	2,400	1,930	1,270	842	1,070	590	500	462	358
27	374	369	2,270	2,060	1,760	1,260	816	859	561	481	444	358
28	341	374	1,750	1,890	1,660	1,240	808	774	681	450	462	380
29	358	547	2,200	1,700	.....	1,210	808	731	698	438	468	369
30	358	2,820	2,150	1,610	.....	1,280	740	774	642	468	500	990
31	347	.....	1,700	1,540	.....	1,420	.....	1,000	.....	481	444	.....

NOTE.—Discharge determined from a rating curve well defined between 250 and 2,000 second-feet.

Monthly discharge of Ocoee River at Emf, Tenn., for the years ending Sept. 30, 1913–1915.

[Drainage area, 530 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1913.						
January	4,780	1,240	1,760	3.32	3.83	B.
February	8,870	1,800	2,590	4.89	5.09	B.
March	16,200	2,320	3,780	7.13	8.22	B.
April	2,320	1,560	2,020	3.81	4.25	B.
May	6,590	1,040	1,540	2.91	3.36	B.
June	3,100	833	1,200	2.26	2.52	B.
July	1,450	590	796	1.50	1.73	B.
August	1,560	426	639	1.21	1.40	B.
September	1,450	299	482	.909	1.01	B.
1913–14.						
October	808	358	498	.940	1.08	B.
November	650	391	451	.851	.95	B.
December	1,180	426	642	1.21	1.40	B.
January	940	426	583	1.10	1.27	B.
February	1,680	561	913	1.72	1.79	B.
March	1,800	494	837	1.58	1.82	B.
April	3,540	816	1,390	2.62	2.92	B.
May	1,210	507	721	1.36	1.57	B.
June	922	326	528	.996	1.11	B.
July	1,920	289	517	.975	1.12	B.
August	922	123	478	.902	1.04	B.
September	723	285	352	.664	.74	B.
The year	3,540	123	657	1.24	16.81	
1914–15.						
October	2,780	294	560	1.06	1.22	B.
November	2,820	336	513	.968	1.08	B.
December	8,230	666	2,000	3.77	4.35	B.
January	2,960	1,140	1,800	3.40	3.92	A.
February	5,740	1,460	2,170	4.09	4.26	A.
March	2,620	1,210	1,570	2.96	3.41	A.
April	1,280	740	984	1.86	2.08	A.
May	2,920	706	1,010	1.91	2.20	B.
June	1,880	561	883	1.67	1.86	B.
July	2,180	438	831	1.57	1.81	A.
August	850	420	529	.998	1.15	A.
September	2,200	358	545	1.03	1.15	A.
The year	8,230	294	1,110	2.09	28.49	

OCOEE RIVER AT PARKSVILLE, TENN.

LOCATION.—About 1,500 feet below Dam No. 1 of the Tennessee Power Co., at Parksville, Polk County, about 1,000 feet below the Louisville & Nashville Railroad bridge, and about 16 miles east of Cleveland, Tenn. Baker Creek enters just above station.

DRAINAGE AREA.—600 square miles (measured by the Tennessee Power Co.).

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1915.

GAGE.—Bristol water-stage recorder about 1,500 feet below dam.

DISCHARGE MEASUREMENTS.—Made from cable just below the gage.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and bowlders. Banks high and do not overflow. Control probably permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage recorded during year, 11.2 feet December 5 (discharge, 9,800 second-feet); minimum mean daily stage recorded, 1.90 feet November 8 and 28 (discharge, 35 second-feet).

1911–1915: Maximum mean daily stage recorded, March 29, 1912 (gage height not available; discharge, 16,500 second-feet); minimum mean daily stage recorded, 1.87 feet January 31, 1914 (discharge, 30 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

REGULATION.—Diurnal fluctuations are caused by operation of power plants above gage, but the use of the water-stage recorder enables the accurate determination of the mean daily gage height.

ACCURACY.—Records considered good.

COOPERATION.—Estimates of daily discharge January 1, 1911, to December 31, 1913, gage-height record January 1, 1914, to September 30, 1915, and the results of numerous discharge measurements furnished by the Tennessee Power Co.

Discharge measurements of Ocoee River at Parksville, Tenn., during the years ending Sept. 30, 1911–1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1910–11.		*Feet.*	*Sec.-ft.*	1914–15.		*Feet.*	*Sec.-ft.*
Feb. 6	Engineers of Tennessee Power Co.	9.58	7,430	Jan. 3	Engineers of Tennessee Power Co.	4.30	1,140
8	....do....	9.38	7,200	11	....do....	5.65	2,250
9	....do....	6.78	3,760	12	....do....	5.75	2,330
10	....do....	5.98	2,850	14	....do....	5.85	2,460
11	....do....	4.99	1,890	14	....do....	6.00	2,560
28	....do....	4.19	1,190	15	....do....	4.45	1,320
June 16	....do....	3.48	640	16	....do....	4.70	1,400
Aug. 24	....do....	3.08	405	Feb. 11	Warren E. Hall.....	5.81	2,530
1914–15.				Apr. 8	Warren E. Hall and L. J. Hall.....	4.89	1,680
Dec. 14	....do....	4.65	1,460	May 26	....do....	3.94	966
15	....do....	2.80	370	June 20	L. J. Hall.....	3.80	867
16	....do....	4.80	1,530	July 14	Warren E. Hall and L. J. Hall.....	4.51	1,400
17	....do....	5.80	2,080	Aug. 6	L. J. Hall.....	4.04	1,030
17	....do....	5.80	2,400	7	....do....	1.95	64
19	....do....	5.16	2,210	7	....do....	3.30	635
21	....do....	5.45	1,990	9	....do....	4.50	1,400
26	....do....	8.40	5,680	10	....do....	2.05	70
27	....do....	6.50	3,190	13	....do....	2.0	58
30	....do....	5.75	2,330	Sept. 10	Warren E. Hall and L. J. Hall.....	4.44	1,300
Jan. 1	....do....	5.60	2,160				
2	....do....	4.35	1,180				

NOTE.—Data for discharge measurements made during 1911 were taken from rating curve furnished by the Tennessee Power Co. Measurements prior to Feb. 11, 1915, were made according to method of the Tennessee Power Co.: on and after Feb. 11, 1915, measurements were made according to methods of the U. S. Geological Survey.

Daily discharge, in second-feet, of Ocoee River at Parksville, Tenn., for the years ending Sept. 30, 1911–1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911.									
1	3,800	1,150	1,510	1,210	1,750	950	550	620	650
2	4,730	1,070	1,560	1,050	1,900	950	520	1,450	500
3	8,000	1,000	1,370	970	1,580	900	480	630	350
4	3,900	1,150	1,250	1,090	1,430	900	530	1,100	350
5	2,050	1,110	1,310	6,060	1,420	900	770	640	650
6	1,700	1,080	1,110	4,510	1,370	950	780	570	1,350
7	1,490	1,400	1,110	2,220	1,340	860	580	510	1,040
8	1,410	5,200	1,170	5,400	1,340	860	580	650	520
9	1,400	3,900	1,110	5,650	1,340	810	910	530	400
10	1,230	2,720	1,110	3,570	1,340	810	920	450	400
11	1,210	1,970	1,170	2,590	1,300	800	1,450	480	600
12	1,150	1,900	970	3,330	1,300	660	1,000	460	670
13	1,050	1,850	970	2,950	1,270	660	650	370	600
14	1,050	1,590	970	2,350	1,100	660	1,850	370	520
15	1,020	1,500	970	2,000	1,100	660	750	580	500
16	1,010	1,400	930	2,460	1,490	660	1,800	650	400
17	950	1,270	930	2,160	1,490	660	880	510	400
18	1,040	1,260	830	1,970	1,490	910	840	580	400
19	1,040	1,490	1,000	2,380	1,490	950	610	770	400
20	1,000	1,680	1,180	3,490	1,480	1,310	580	560	400
21	1,000	1,400	1,070	4,000	1,740	800	580	510	480
22	980	1,160	970	2,660	1,280	770	910	510	480
23	970	1,140	970	2,220	1,500	730	720	430	650
24	900	1,100	970	1,860	1,570	730	650	360	480
25	890	1,100	930	1,750	1,180	760	2,610	350	480
26	1,000	1,160	1,470	1,760	1,100	630	870	280	700
27	900	1,170	2,460	1,700	1,040	550	650	280	400
28	910	1,180	1,600	1,720	960	620	580	340	350
29	1,050	.....	1,410	1,900	960	560	550	510	350
30	1,580	.....	1,300	1,750	960	560	500	510	350
31	1,440	.....	1,200	.....	960	.....	460	510	.....

Daily discharge, in second-feet, of Ocoee River at Parksville, Tenn., for the years ending Sept. 30, 1911–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	350	460	710	2,350	1,590	2,170	4,140	3,800	2,440	1,600	1,240	556
2	350	460	580	1,678	1,540	2,170	3,700	3,210	2,070	1,360	1,130	665
3	350	460	580	1,501	1,220	2,260	3,280	2,910	2,180	1,280	740	635
4	330	460	520	1,350	1,320	2,390	2,970	2,930	2,240	1,440	910	630
5	330	460	520	1,000	1,260	2,470	2,750	2,720	1,800	1,700	1,020	575
6	330	400	530	1,120	1,090	3,000	2,650	2,620	1,560	2,300	1,150	590
7	300	920	520	1,000	1,270	2,820	2,460	3,530	2,180	1,640	840	717
8	300	670	500	840	1,270	2,810	2,670	3,580	1,690	1,890	770	760
9	490	990	500	1,613	1,050	2,930	2,450	2,890	1,960	1,590	1,010	894
10	500	600	500	1,380	1,330	2,640	2,330	2,700	1,500	2,270	1,540	772
11	1,640	730	460	1,085	1,150	2,630	2,260	2,450	2,560	1,700	1,250	775
12	640	800	520	992	1,150	2,980	2,250	2,270	2,000	1,740	1,190	753
13	470	1,650	530	1,046	1,190	3,320	2,270	2,200	1,680	1,670	1,040	715
14	400	950	530	1,251	1,130	3,300	1,900	2,010	1,490	1,250	810	789
15	400	810	540	878	3,640	9,600	2,480	2,110	2,200	1,400	980	604
16	350	700	650	662	2,720	5,440	3,060	2,100	3,080	1,260	890	563
17	2,800	580	650	675	2,050	4,070	2,970	1,930	2,340	1,270	740	1,126
18	2,800	880	570	700	1,830	3,630	3,570	1,900	1,870	1,100	750	1,013
19	1,070	880	560	1,092	1,960	3,200	2,860	1,790	1,660	1,430	950	955
20	680	720	550	975	1,560	2,820	2,770	1,750	1,420	1,600	1,010	750
21	600	680	1,000	840	2,570	2,800	3,430	1,760	1,400	1,420	860	890
22	600	680	940	600	2,570	2,550	5,790	1,760	1,240	1,370	1,320	670
23	600	600	2,830	1,793	2,870	2,730	4,450	1,580	960	1,120	1,520	2,500
24	500	660	1,190	951	2,980	5,200	3,150	1,490	1,180	1,100	1,430	2,280
25	470	660	1,400	825	2,670	5,600	2,860	1,450	2,410	1,140	690	1,335
26	470	660	2,180	700	6,370	3,670	2,660	1,290	2,190	1,030	780	1,185
27	470	660	4,500	780	6,050	3,160	4,780	1,590	2,070	1,080	980	1,045
28	470	660	2,600	1,085	3,980	3,330	5,580	2,850	2,060	710	730	860
29	470	730	1,430	2,958	3,310	16,500	4,600	7,230	1,700	1,110	660	965
30	300	730	1,540	4,024	.....	7,200	4,170	5,430	1,370	1,100	660	1,028
31	300	.....	1,540	2,349	.....	4,560	.....	3,000	.....	770	610	.....
1912–13.												
1	855	905	260	1,500	2,424	3,627	2,746	1,250	1,182	1,095	670	470
2	965	930	620	1,450	1,877	2,573	2,696	1,190	1,605	960	648	624
3	845	679	564	1,770	2,129	2,213	2,411	1,169	1,608	673	381	543
4	800	900	607	1,725	2,121	2,015	2,258	859	1,486	535	747	552
5	850	880	569	1,275	2,007	1,959	2,154	1,465	1,662	638	745	562
6	710	800	908	1,605	1,842	1,633	1,953	1,290	1,650	550	730	518
7	918	906	1,396	1,440	1,654	1,634	2,019	1,189	1,542	680	700	330
8	750	780	1,087	1,425	1,540	1,605	1,964	1,455	1,307	730	637	496
9	740	780	1,200	1,610	1,254	1,307	1,877	1,779	1,732	730	807	620
10	620	434	1,065	1,550	1,537	2,059	1,804	1,590	1,683	695	714	505
11	810	739	963	1,585	2,000	2,878	2,049	899	1,728	604	1,000	500
12	860	760	665	1,335	3,910	2,331	2,052	1,607	1,670	675	998	341
13	580	754	640	2,290	3,375	2,213	1,822	1,430	1,676	510	985	345
14	900	860	820	1,945	2,680	14,764	1,979	1,594	1,640	750	888	85
15	950	950	590	1,730	2,475	7,787	2,087	1 562	1,236	735	975	475
16	945	789	840	1,590	1,955	5,087	2,017	1,440	1,702	720	988	567
17	860	490	840	1,422	2,020	3,672	1,844	1,561	1,694	725	506	572
18	910	836	800	1,600	1,960	2,907	1,648	1,005	1,732	730	820	522
19	760	818	860	1,760	2,050	2,692	1,554	1,412	1,691	730	863	562
20	1,370	789	700	1,800	2,110	2,614	1,165	1,220	1,757	552	970	541
21	1,415	797	690	1,930	2,609	3,739	1,450	1,188	1,690	614	760	176
22	1,299	826	580	1,750	2,373	3,640	1,340	1,162	1,245	540	795	500
23	1,039	817	890	2,010	1,985	2,905	1,262	1,516	1,535	564	750	555
24	858	505	880	2,300	2,236	2,440	1,234	3,726	1,380	566	275	604
25	893	1,044	820	3,920	1,947	2,394	1,270	2,662	1,288	567	734	650
26	871	650	930	3,085	1,719	3,875	1,398	1,990	1,200	466	720	568
27	740	700	1,000	3,845	9,844	11,398	1,316	1,868	960	144	700	577
28	876	417	980	3,725	7,063	5,844	1,539	1,709	1,135	326	573	168
29	908	560	770	3,020	.....	3,812	1,372	1,719	495	465	534	587
30	870	590	1,100	2,445	.....	3,132	1,364	1,691	1,080	455	557	570
31	750	.....	1,650	2,390	.....	3,031	.....	1,582	.....	633	130	.....

Daily discharge, in second-feet, of Ocoee River at Parksville, Tenn., for the years ending Sept. 30, 1911–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	585	560	294	665	239	1,240	822	1,240	878	742	336	640
2	560	172	365	822	314	1,410	768	1,380	878	742	359	406
3	615	557	466	878	355	936	850	1,410	878	309	239	314
4	511	550	609	665	492	1,240	1,030	1,490	878	282	296	406
5	360	605	674	966	482	1,270	966	1,410	997	182	218	482
6	590	615	635	1,060	341	1,030	1,270	1,340	878	260	227	600
7	565	670	470	1,060	454	1,200	1,340	1,130	997	411	291	630
8	568	1,103	460	936	420	822	1,410	1,340	878	478	454	850
9	553	687	505	966	768	1,200	966	1,340	768	444	359	645
10	516	800	585	907	615	1,160	1,030	1,200	3,620	296	373	565
11	536	903	718	1,490	822	1,030	1,130	1,690	665	260	497	655
12	170	656	1,551	1,130	936	1,030	1,240	2,900	1,130	387	690	492
13	580	662	1,257	1,200	878	997	1,200	1 570	2,470	742	822	468
14	504	803	1,133	907	795	966	1,200	1,730	665	630	822	516
15	598	560	695	540	565	850	1,340	1,770	768	492	590	382
16	582	253	700	341	850	966	1,300	1,770	468	420	454	650
17	590	592	760	336	966	997	1,300	1,450	468	314	625	680
18	580	582	645	327	1,030	936	1,380	1,650	997	296	540	590
19	340	600	450	420	690	997	822	1,060	716	291	406	550
20	637	724	460	345	680	997	1,380	878	2,680	291	430	742
21	720	535	300	387	640	966	1,450	1,060	878	468	304	701
22	622	420	418	392	296	850	1,450	997	468	269	359	502
23	635	290	280	478	645	997	1,380	716	878	406	690	506
24	615	380	370	630	600	822	1,410	506	997	336	690	148
25	468	580	315	309	742	768	1,380	742	615	359	387	273
26	253	630	440	364	701	768	966	716	716	478	387	401
27	530	255	435	454	768	850	1,380	506	468	590	327	231
28	400	507	430	487	1,690	655	1,490	516	878	420	630	492
29	342	533	490	492	.....	690	1,610	655	665	492	690	454
30	512	300	490	444	.....	850	1,380	468	768	506	430	506
31	686	.....	630	30	.....	768	.....	444	.....	84	625	.....
1914–15.												
1	580	350	1,030	1,770	4,530	1,900	1,570	680	997	742	182	615
2	565	327	936	1,270	6,700	1,810	1,410	716	1,130	1,240	716	665
3	116	218	1,240	1,130	3,620	1,340	1,340	1,160	1,060	1,270	600	595
4	48	282	9,350	1,610	2,320	1,570	1,060	1,270	1,030	966	650	635
5	291	282	9,800	1,410	1,940	2,270	1,300	1,030	907	2,370	526	159
6	291	420	5,440	1,730	2,170	3,140	1,240	936	696	2,470	511	533
7	252	239	4,920	3,380	1,940	2,370	1,200	1,130	1,100	1,270	336	907
8	304	35	3,880	2,420	2,320	2,270	1,130	3,260	1,130	1,130	110	768
9	540	106	2,080	1,940	2,040	1,810	1,130	1,990	1,200	1,940	742	665
10	350	565	795	1,270	1,730	1,900	1,130	1,240	1,130	1,380	822	640
11	206	444	1,340	2,120	1,900	1,730	1,030	1,160	850	1,770	768	696
12	350	260	716	2,270	1,570	1,650	1,570	1,130	822	936	795	60
13	742	492	350	1,860	1,300	1,650	1,410	1,130	630	997	742	768
14	341	420	966	1,730	1,450	1,650	1,200	1,270	2,320	1,270	411	878
15	341	106	716	1,530	2,370	1,990	1,160	1,200	2,620	1,030	103	1,410
16	502	350	997	1,340	2,680	1,900	1,270	1,200	1,610	1,060	536	997
17	231	1,200	1,690	1,340	2,370	1,490	1,340	1,270	1,200	650	327	878
18	309	795	1,730	2,740	2,470	1,130	907	997	1,060	742	90	502
19	148	665	1,270	2,470	1,410	1,340	1,060	878	1,130	795	420	159
20	282	878	239	2,470	1,300	1,570	1,130	936	822	768	1,570	458
21	248	350	1,100	1,940	1,490	1,490	1,030	850	907	795	1,030	526
22	296	60	1,650	1,690	1,570	1,810	997	768	822	625	248	716
23	526	218	1,200	1,990	1,730	1,410	936	701	907	497	327	907
24	411	239	1,060	2,120	3,140	1,270	997	768	600	620	341	540
25	526	742	6,420	3,620	3,140	1,270	795	878	565	570	345	449
26	516	716	8,000	2,840	2,370	1,410	1,060	997	716	822	401	78
27	675	822	3,620	2,220	1,900	1,270	1,060	1,130	650	526	526	696
28	580	35	2,520	2,220	1,570	1,300	936	1,410	878	502	420	878
29	420	248	2,420	1,900	.....	1,300	850	878	878	615	605	497
30	516	273	2,270	1,410	.....	1,410	768	665	701	595	768	396
31	716	.....	1,610	1,410	.....	1,410	.....	850	.....	511	444	.....

NOTE.—Discharge Jan. 1, 1914, to Sept. 30, 1915, determined from a rating curve well defined between 60 and 8,000 second-feet. Discharge June 24 and 27, and Sept. 6, 1915, interpolated. Determinations of discharge prior to Jan. 1, 1914, furnished by Tennessee Power Co.

Monthly discharge of Ocoee River at Parksville, Tenn., for the years ending Sept. 30, 1911–1915.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
1911.			
January	8,000	890	1,670
February	5,200	1,000	1,610
March	2,460	830	1,190
April	6,060	970	2,620
May	1,900	960	1,340
June	1,310	550	784
July	2,610	460	842
August	1,450	280	551
September	1,350	350	527
1911–12.			
October	2,800	300	649
November	1,650	400	710
December	4,500	460	1,040
January	4,024	600	1,290
February	6,370	1,050	2,230
March	16,500	2,170	4,000
April	5,790	1,900	3,240
May	7,230	1,290	2,610
June	3,080	960	1,880
July	2,300	710	1,400
August	1,540	610	974
September	2,500	556	920
The year	16,500	300	1,740
1912–13.			
October	1,415	580	888
November	1,044	417	756
December	1,650	260	848
January	3,920	1,275	2,030
February	9,844	1,254	2,600
March	14,764	1,307	3,670
April	2,746	1,165	1,790
May	3,726	859	1,540
June	1,757	495	1,470
July	1,095	144	624
August	1,000	130	719
September	650	85	490
The year	14,764	85	1,450
1913–14.			
October	720	170	527
November	1,103	172	569
December	1,551	280	582
January	1,490	30	659
February	1,690	239	670
March	1,410	655	976
April	1,610	768	1,220
May	2,900	444	1,200
June	3,620	468	1,000
July	742	84	409
August	822	218	469
September	850	148	516
The year	3,620	30	732
1914–15.			
October	742	48	394
November	1,200	35	405
December	9,800	239	2,620
January	3,620	1,130	1,970
February	6,700	1,300	2,320
March	3,140	1,130	1,670
April	1,570	768	1,130
May	3,260	665	1,110
June	2,620	565	1,040
July	2,470	497	1,020
August	1,570	90	529
September	1,410	60	622
The year	9,800	35	1,230

BIG BEAR RIVER NEAR RED BAY, ALA.

LOCATION.—At Norman Bridge 2½ miles east of Red Bay, Franklin County, and about 4 miles below Blue Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24, 1913, to September 30, 1915.

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.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Bed of river consists of gravel; probably shifting. During extreme low water current is sluggish and irregular. Left bank will overflow at stages above about 12 feet.

EXTREMES OF STAGE.—Maximum stage recorded during year, 13.5 feet at 7 a. m. February 2; miniumm stage recorded, 0.6 foot at 7 a. m. November 6 and 7, July 31, and August 1 to 8.

1913–1915: Maximum stage recorded, 13.5 feet at 7 a. m., February 2, 1915; minium stage recorded, 0.5 foot at 7 a. m. July 8 and 9 and September 18, 1913.

WINTER FLOW.—Discharge relation not affected by ice.

ACCURACY.—Gage-height record considered reliable.

COOPERATION.—Gage readings furnished by the Geological Survey of Alabama.

Data inadequate for determining daily discharge.

Discharge measurements of Big Bear River near Red Bay, Ala., during the year ending Sept. 30, 1915.

[Made by Frank Lederle.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Jan. 2	3.98	748
2	3.92	766

Daily gage height, in feet, of Big Bear River near Red Bay, Ala., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.8	0.8	2.5	5.7	12.6	2.4	2.4	1.2	1.1	1.7	0.6	1.6
2	.8	.7	1.7	4.1	13.5	2.4	2.2	1.3	1.5	1.4	.6	1.4
3	.9	.7	1.4	3.5	11.3	2.3	2.0	1.3	1.3	1.4	.6	1.2
4	.9	.7	1.6	3.0	7.1	2.2	2.0	1.2	1.2	1.9	.6	1.1
5	.8	.7	2.0	2.7	6.0	3.3	1.9	1.1	1.1	2.1	.6	1.1
6	.8	.6	1.8	2.7	6.8	6.4	1.9	1.1	1.1	2.8	.6	1.0
7	.8	.6	1.5	2.6	5.6	5.0	1.8	1.6	1.0	2.0	.6	1.0
8	.7	.7	1.4	2.4	4.8	4.1	1.8	3.3	1.0	1.6	.6	.9
9	.7	.8	1.4	2.3	4.2	3.5	1.7	2.4	.9	3.0	.8	1.0
10	1.0	1.0	1.3	2.1	3.7	3.1	1.7	1.9	.9	4.0	1.0	2.4
11	.8	1.0	1.2	2.2	3.3	2.9	1.8	1.6	.8	2.1	1.8	2.0
12	.9	1.0	1.2	5.1	3.0	2.7	3.3	2.4	.8	1.7	3.0	1.3
13	1.2	.9	1.3	6.4	2.8	2.5	2.7	4.0	.8	1.4	2.5	1.1
14	2.1	.9	1.7	4.5	3.3	2.4	2.2	3.1	1.0	1.2	2.0	1.0
15	2.9	.9	1.8	3.8	4.0	2.3	2.0	2.7	.9	1.1	1.4	1.0
16	2.5	.8	1.7	3.3	4.0	2.4	2.0	2.2	.9	1.0	1.1	.9
17	1.6	.8	1.6	3.6	3.5	2.5	1.9	1.9	.8	1.0	1.0	.9
18	1.4	.8	1.5	7.2	3.0	2.4	1.8	1.8	.8	1.0	.9	.8
19	1.1	.8	1.5	11.0	2.8	2.2	1.7	1.7	.7	.9	1.0	.8
20	1.0	.8	1.6	7.8	2.7	2.3	1.6	1.5	.7	1.0	4.2	.8
21	1.0	.7	1.7	5.3	2.6	2.2	1.5	1.4	.7	1.0	2.3	1.0
22	.9	.7	1.7	5.0	2.6	2.1	1.5	1.3	.7	.9	1.6	.9
23	.9	.7	1.8	5.7	2.7	2.0	1.7	1.3	.8	1.0	1.2	.8
24	.9	.8	2.0	10.8	2.8	2.0	1.6	1.2	.8	1.0	1.7	.8
25	.8	.8	7.6	8.3	2.5	1.9	1.5	1.1	.8	.8	1.1	.7
26	.8	.8	12.6	5.8	2.4	1.8	1.4	1.1	.8	.8	2.0	.7
27	.8	.8	10.0	4.7	2.3	1.8	1.3	1.0	.7	.8	3.5	.7
28	.7	.9	5.3	4.0	2.3	1.9	1.3	1.0	.8	.7	6.8	.7
29	.7	1.2	6.5	3.5	.....	1.9	1.3	1.0	.8	.7	2.8	.7
30	.7	2.1	12.0	3.3	.....	2.0	1.2	1.2	3.2	.7	2.0	1.0
31	.7	.....	8.6	3.5	.....	2.1	.....	1.2	.....	.6	1.8	.....

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:

Miscellaneous measurements in Ohio River drainage basin in the year ending Sept 30, 1915.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Apr. 13	Kentucky River	Ohio River	Frankfort, Ky	[a] 7.61	3,100
13	Benson Creek		Near Frankfort, Ky		[b] 5
Nov. 7	Ocoee River	Hiwassee River	Copperhill, Tenn	[c] .43	232

[a] Upper gage at Lock 4.
[b] Estimated.
[c] At old gaging station of U. S. Geological Survey.

INDEX.

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART III.—OHIO RIVER BASIN

60399°—WSP 403—17——12

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, underground 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 volumes).

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.

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.
St. Paul, Minn., Old Capitol Building.
Austin, Tex., Old Post Office Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 403 New Post Office Building.
Phoenix, Ariz., 417 Fleming Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho 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 3,800 points in the United States, and the data have been published in the reports tabulated below:

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	Description, 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.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
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.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at 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 1915. 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 1915 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, and 403, which contain records for the Ohio River basin for those years.

Numbers of water-supply papers containing results of stream measurements, 1899-1915.

Year.	I North Atlantic slope (St. John River to York River).	II South Atlantic and eastern Gulf of Mexico (James River to the Mississippi).	III Ohio River	IV St. Lawrence River and Great Lakes.	V Hudson Bay and upper Mississippi River.	VI Missouri River.	VII Lower Mississippi River.	VIII Western Gulf of Mexico.	IX Colorado River.	X Great Basin.	XI Pacific slope in California.	XII North Pacific slope basins.		
												Pacific slope in Washington and upper Columbia River.	Snake River basin.	Lower Columbia River and Pacific slope 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, [r] 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	312
1912	321	322	323	324	325	326	327	328	329	330	331	332A	332B	332C
1913	351	352	353	354	355	356	357	358	359	360	361	362A	362B	362C
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

[a] Rating tables and index to Water-Supply Papers 35-39 contained in Water-Supply Paper 39. Estimates 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 Kern 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. Estimates 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.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated on page III, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

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. XIX–XX.)

GAGING STATIONS.

NOTE.—Dash following a date indicates that the station was being maintained September 30, 1915. Period after date indicates discontinuance. Tributaries are indicated by indention.

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 (Chautauqua Lake outlet) near Jamestown, N. Y., 1904–5.
Kiskiminitas River at Avonmore, Pa., 1907–1913.
Kiskiminitas River at Salina, Pa., 1904–5.
Blacklick Creek at Blacklick, Pa., 1904–1906; 1907–1913.
Tygart River (head of Monongahela River) near Dailey, W. Va., 1915–
Tygart 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–
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–
Dry Fork (head of Cheat River):
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–

Ohio River tributaries—Continued.
Wabash River tributaries—Continued.
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; 1908–
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.
Tennessee River at Florence, Ala., 1871–
Tennessee River at Johnsonville, Tenn., 1875–1913.
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 Greeneville, Tenn., 1903–1908.
North Toe River at Spruce Pine, N. C., 1907–8.
Holston River, South Fork (head of Holston River), near Chilhowee, Va., 1907–1909.
Holston River, South Fork, at Bluff City, Tenn., 1900–
Holston River near Rogersville, Tenn., 1904–
Middle Fork of Holston River at Chilhowee, Va., 1907–1909.
Watauga River at Butler, Tenn., 1900–1901.
Watauga River near Elizabethton, Tenn., 1903–1908.
Elk Creek at Lineback, Tenn., 1900–1901.
Roane Creek at Butler, Tenn., 1900–1901.
Doe River at Blevins, Tenn., 1911–1915.
Doe River at Valley Forge, Tenn., 1911–
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–

Ohio River tributaries—Continued.
Tennessee River tributaries—Continued.
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.

*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.

57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. 5c.

[1] For stream-measurement reports see tables on pp. IV–VI.

61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" give information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States and the States are arranged alphabetically. A second, revised, edition was published in 1905 as Water-Supply Paper 149 (q. v.).

62. Hydrography of the southern Appalachian Mountain region, 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 underground 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.

Contains 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.

*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 reports as follows: Water resources of the Middlesboro-Harlan region of southeastern Kentucky, by George H. Ashley. Describes briefly the 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 mineral 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, 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. 206 pp., 18 pls. 15c.

Contains "Wabash River flood, Indiana," by F. W. Hanna. Describes 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.

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; also index to literature on floods in American streams.

*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 formation, physiographic features, soils, and surface waters of the region; the source, conditions of occurrence, amount and recovery of the underground waters, collection and storage of rainwaters, 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 occurrence, 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.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

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, xxv, 864 pp., 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 Illinois, Des Plaines Kankakee, Fox, Illinois-Vermilion, Spoon, Mackinaw, and Sangamon rivers, Macoupin Creek Rock River, tributaries of the Mississippi in western Illinois, Kaskaskia, Big Muddy, 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, x, 756 pp., 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, 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, viii, 814 pp., 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.

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.

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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 Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia, and detailed records of wells in Crawford County, Ill.; Delaware, Martin, Randolph, and Vanderburg counties, Ind.; Hopkins and Metcalf counties, Ky.; Hocking, Noble, Tuscarawas, and Wayne counties, Ohio; Armstrong, Greene, 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 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 80 or 90 per cent of the folios are usable. They will be 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 sells for 50 cents a copy, except folio 193, which sells for 75 cents a copy. A

[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.

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, Tennessee-North Carolina.

67. Danville, 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, Indiana. 5c.

90. Cranberry, North Carolina-Tennessee. 5c.

102. Indiana, Pennsylvania. 5c.
Indicates promising localities for artesian water.

105. Patoka, Indiana-Illinois, 5c.
Discusses the water supply of the streams, springs, wells, cisterns, and artificial ponds.

*121. Waynesburg, Pennsylvania. 5c.

123. Elders Ridge, Pennsylvania. 5c.

124. Mount Mitchell, North Carolina-Tennessee. 5c.
Describes 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. 5c.

147. Pisgah, North Carolina-South Carolina. 5c.

*151. Roan Mountain, Tennessee-North Carolina.

160. Accident-Grantsville, Maryland-Pennsylvania-West Virginia. 5c.
Notes possibility of obtaining artesian water.

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.

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 Penn-

[1] Issued in two editions (see p. xviii); specify which edition is wanted.
[2] Library edition out of stock.

sylvania 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 River, 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.

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. 10c.

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, makes comparisons of 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 No. 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.

*32. Water resources of Puerto Rico, by H. M. Wilson. 1899. 48 pp., 17 pls. 15c.

Describes briefly topography, climate, rivers, irrigation methods, soils, forestation, water power, and transportation facilities.

*41. The windmill: its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 15c.

*42. The windmill: its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp., 2 pls. 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.

*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, also brief descriptions of many of the streams. Arrangement geographic. Many river profiles are scattered through other reports on surface waters in various parts of the United States.

*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.

57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" give information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second, revised, edition was published in 1905 as Water-Supply Paper 149 (q. v.). 5c.

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 underground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of underground 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 well; 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.

77. The water resources of Molokai, Hawaiian Islands, by Waldemar Lindgren. 1903. 62 pp., 4 pls. 10c.

Describes briefly the topography, geology, coral reefs, climate, soils, vegetation, forests, and fauna of the island, the springs, running streams, and wells, and discusses the utilization of the surface and underground waters.

*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 effect 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 2 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.

Contains, in addition to an account of the organization of the hydrographic [water resources] branch of the United States Geological Survey and the reports of the conference, 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 A. 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.

Notes on the hydrology of Cuba, by M. L. Fuller.

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 underground waters in eastern United States.

115. River surveys and profiles made during 1903, 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.

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.

Scope indicated by title.

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.

Scope indicated by title.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies ground 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.

Scope indicated by title.

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 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.

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 1904, 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.

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 available 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.

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. 10c.

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 inland waters 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 fluctuation due to rainfall and evaporation, barometric changes, temperature, 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 underground 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, by C-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and recent 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. 10c.

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. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls. 5c.

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 Illinois and the Sanitary District of Chicago, by M. O. Leighton. 1907. 369 pp., 2 pls. 40c.

Scope indicated by amplification of title.

*196. Water supply of Nome region, Seward Peninsula, Alaska, 1906, by J. C. Hoyt and F. F. Henshaw. 1907. 52 pp., 6 pls. 15c.

Gives results of measurements of flow of Alaskan streams, discusses available water supply for ditch and pipe lines and power development; presents notes for investors.

*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.

*218. Water-supply investigations in Alaska, 1906–1907, Nome and Kougarok regions, Seward Peninsula; Fairbanks district, Yukon-Tanana region, by F. F. Henshaw and C. C. Covert. 1908. 156 pp., 12 pls. 25c.

Describes the drainage basins, gives results of observations at the gaging stations, and discusses the water supply of the ditches and pipe lines and possibilities of development; gives also meteorological records.

*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.

228. Water-supply investigations of the Yukon-Tanana region, Alaska, 1907 and 1908, Fairbanks, Circle, and Rampart districts, by C. C. Covert and C. E. Ellsworth. 1909. 108 pp., 7 pls. 20c.

Describes the drainage basins, gives results of observations at gaging stations, and discusses the water supplies of the ditches and pipe lines and possibilities of hydraulic development.

*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 underground 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. 123 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.

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 occurrence, and head of the waters, and municipal supplies; gives details by counties; discusses in supplement, under chemical character, method of analysis 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.)

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 analytical work, and methods of analyses; discusses soap-consuming power of waters, water-softening, boiler waters, and waters for irrigation; gives results of analyses of waters of the Rio Grande and of Pecos, Gallinas, and Hondo rivers.

280. Gaging stations maintained by the United States Geological Survey, 1888–1910, and Survey publications relating to water resources, compiled by B. D. Wood. 1912. 102 pp. 10c.

314. Surface water supply of Seward Peninsula, Alaska, by F. F. Henshaw and G. L. Parker, with a sketch of the geography and geology by P. S. Smith, and a description of methods of placer mining by A. H. Brooks. 1913. 317 pp., 17 pls. 45c.

Contains results of work at gaging stations.

*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.

318. Water resources of Hawaii, 1909–1911, by W. F. Martin and C. H. Pierce. 1913. 552 pp., 15 pls. 50c.

Describes the general features of the islands and gives results of measurements of streams and of observations of rainfall and evaporation; contains a gazetteer.

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.

336. Water resources of Hawaii, 1912, by C. H. Pierce and G. K. Larrison. 1914. 392 pp. 50c.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

342. Surface water supply of the Yukon-Tanana region, Alaska, by C. E. Ellsworth, and R. W. Davenport. 1915. 343 pp., 13 pls. 45c.

Presents results of six years' observations of the water supply of the Yukon-Tanana region; discusses climate and precipitation, and gives station records.

*345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c.

*(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.

(f) The discharge of Yukon River at Eagle, Alaska, by E. A. Porter and R. W. Davenport, pp. 67–77, pls. 4 and 5. 5c.

Describes briefly the location and size of the Yukon basin, the climatic conditions in the basin, and methods of collecting hydrometric data; compares run-off with precipitation, and gives table showing the discharge of some of the large rivers in the United States as compared with the discharge of the Yukon and the Nile.

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 waters from rivers, lakes, wells, and springs in various parts of the United States, including the geysers of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing recording and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

372. A water-power reconnaissance in south-central Alaska, by C. E. Ellsworth and R. W. Davenport, with a section on southeastern Alaska, by J. C. Hoyt. 1915. 173 pp., 22 pls. 20c.

373. Water resources of Hawaii, 1913, by G. K. Larrison. 1915. 190 pp. 20c.
Contains results of stream measurements.

*375. Contributions to the hydrology of the United States, 1915. N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls.
(c) Relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.
(e) A method for 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.
Three papers presented at the conference of engineers of the Water Resources Branch in December, 1914.

400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer.
(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.

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. 368–561, pls. 107 to 146. See Water-Supply Paper 87.

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 brief 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.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. IV, Hydrography, vii, 660 pp., 75 pls. $1.40. Contains:

*Hydrography of Nicaragua, by A. P. Davis, pp. 563–637, pls. 64 to 75. Describes the topographic features of the boundary, the lake basin, and Rio San Juan; gives a brief résumé of the boundary dispute; discusses rainfall, temperature, and relative humidity, evaporation, resources, and productions, the ship, railway, and canal projects; gives the history of the investigations by the Canal Commission, and results of measurements on the Rio Grande, on streams tributary to Lake Nicaragua, and on Rio San Juan and its tributaries.

Twenty-second Annual Report of the United States Geological Survey, 1900–1901, Charles D. Walcott, Director. 1901. (Parts III and IV, 1902.) 4 parts. *Pt. IV, Hydrography, 690 pp., 65 pls. $2.20. Contains:

*Hydrography of the American Isthmus, by A. P. Davis, pp. 507–630, pls. 37 to 50. Describes the physiography, temperature, rainfall, and winds of Central America; discusses the hydrography of the Nicaragua Canal route and the Panama Canal route; gives estimated monthly discharge of many of the streams, rainfall, and evaporation tables at various points.

PROFESSIONAL PAPERS.

*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.

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.

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 so far as available.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Bulletins 264 and 298 discuss the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describe the general methods of work; give tabulated records of wells by States, and detailed records selected as affording valuable stratigraphic information.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller, 1908. 10c.

Describes underground reservoirs, the sources of underground 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.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; G F=Geologic folio.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.