DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 236

THE QUALITY OF SURFACE WATERS IN THE UNITED STATES

PART I.—ANALYSES OF WATERS EAST OF THE ONE HUNDREDTH MERIDIAN

BY

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

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THE QUALITY OF SURFACE WATERS IN THE UNITED STATES.

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By R. B. DOLE.

INTRODUCTION.

In the present period of increased scrutiny and careful analysis of the production costs of industrial processes manufacturers are giving more attention than formerly to the quality of water supplies, because water in some form is necessary for the operation of every industrial establishment. During the last twenty years the practical man has been obliged to modify his views, previously limited only by the quantity of available water, by considering the part of his manufacturing cost that is due to the use of water unsuited to his processes. In the adoption of water for domestic supply one of the most important features that affects its value is its potability, which is determined principally by its freedom from dangerous, ill-smelling, or bad-tasting organisms. In the application of water to industrial use, however, biologic features are usually secondary in importance, and the suitability of the supply depends on the amount of mineral matter that is dissolved or suspended in it. This is especially true of waters which are used for steam making, for paper manufacture, and for some other processes. The hygienic quality, as well as the physical and chemical characteristics, must be given due weight in some industries, such as starch making, brewing, distilling, and ice manufacture, but the industrial water problem is primarily a consideration of the mineral substances contained in the supplies. As water dissolves more or less of everything with which it comes in contact, natural waters contain a great variety of matter in solution and in suspension, and their relative purity depends on the locality from which they come. Waters that have percolated through limestone are hard; those that have traversed regions of alkali are alkaline; the run-off from swamps is colored and contains much organic matter; the drainage from populated districts is polluted by disease-bearing organisms that render it unpotable. It is essential, therefore, to study the composition of river waters and their adaptability to different industrial processes.

The tremendous importance that the mineral quality of water has attained in these fields led the Geological Survey to undertake a detailed study of the quality of industrial water supplies, both surface and underground, and it became advisable during this investigation to procure information regarding the chemical composition of the waters of the lakes and streams of the United States. This volume, which forms Part 1 of the complete report, presents the detailed results of analyses of surface waters east of the one hundredth meridian. It gives merely the methods of analysis, the location of the sampling stations, and the analytical results, because the demand for the data has been great enough to justify the publication of the analyses before their detailed discussion. Part 2 will discuss the analyses in relation to stream flow, climate, forestation, geologic environment, pollution, and other factors. Another report now in preparation will consider the quality of the waters in special reference to their availability for industrial use, and a paper on chemical denudation in the United States will discuss aqueous erosion in relation to geologic time. For river waters in Illinois only the average chemical composition is given in the present volume, as detailed analyses of the waters from that State, with discussions, are to be included in a separate report.

PREVIOUS INVESTIGATIONS.

A few series of analyses representing samples of water collected systematically from some rivers and lakes in the United States have been published. The greater part of such work, however, has been performed for the purpose of obtaining information regarding the potability of water supplies rather than regarding their availability for industrial use, and as a result of this somewhat one-sided activity the data have reference to inorganic constituents only through determinations that are more or less incidental in sanitary water analysis. Yet the information in work of that character, especially in respect to estimates of total solids, chlorine, hardness, alkalinity, and iron, is valuable in general comparisons and is worth the attention of those who are interested in the mineral characteristics of waters. Especially valuable investigations of this nature have been conducted at Boston, Mass.,[a] Lawrence, Mass.,[b] New Orleans, La.,[c] New York,

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[a] Boston Water Board, Ann. Repts., 1880 et seq.

[b] Reports of the Lawrence sewage experiment station.

[c] Sewerage and Water Board Report, New Orleans.

N. Y.,[a] Louisville, Ky.,[b] Cincinnati, Ohio,[c] St. Louis, Mo.,[d] and in Massachusetts,[e] Ohio,[f] and Illinois.[d]

Several hundred more or less complete analyses of surface waters can be found in the bulletins, water-supply papers, and other reports of the United States Geological Survey, in reports of state geological surveys, in bulletins of agricultural experiment stations, and in publications of scientific societies. Probably a still larger number remain unpublished in the hands of railroad and other industrial chemists, to whom the composition of water supplies is extremely important. All such data, though they are usually excellent in quality and undoubtedly valuable in many respects, are limited in their application, because the small number of samples that were collected from each source make it doubtful whether figures representing even approximately the maximum and minimum conditions of quality were encountered and whether averages of such analyses represent the average chemical composition of the waters considered.

The serial analyses of waters from the Rio Grande at Mesilla, N. Mex., by Goss,[g] and from Colorado River at Yuma and Salt River at Mesa, Ariz., by Forbes and Skinner,[h] deserve separate mention. In 1906 and 1907 series of samples of water from streams in the arid States were analyzed for the Reclamation Service by C. H. Stone and F. M. Eaton under the direction of W. H. Heileman, but the results of that study have not yet been published.

HISTORY OF THE PRESENT INVESTIGATION.

In the spring of 1905 arrangements were effected under which samples of water from Androscoggin River at Brunswick, Me., were collected for a year and analyzed by Prof. F. C. Robinson, of Bowdoin College, and from Mississippi River at New Orleans, La., by J. L. Porter, of the New Orleans Water and Sewerage Board. In the winter of 1905–6 a cooperative agreement between the United States Geological Survey and the State Board of Examiners of California was effected, under which samples of river water were collected at 20 stations in that State, united in sets of ten, and analyzed. This cooperation continued for one year and was resumed in the fall of

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[a] Report of the commission on additional water supply of the city of New York, 1904.

[b] Fuller, G. W., Report on the investigations into the purification of the Ohio River water at Louisville, Ky., 1898.

[c] Board of trustees and commissioners of waterworks, Cincinnati: Report on the investigation into the purification of the Ohio River water for the improved water supply for the city of Cincinnati, Ohio, 1899.

[d] Reynolds, A. R., Report of streams examination of the waters between Lake Michigan at Chicago and the Mississippi River at St. Louis, 1902. Long, J. H., Chemical and bacterial examinations of the waters of the Illinois River and its tributaries; report of the sanitary investigations of the Illinois River and its tributaries: Illinois State Board of Health, 1901. Palmer, A. W., Chemical survey of the waters of Illinois: Report for the years 1897-1902, University of Illinois, 1903.

[e] Massachusetts State Board of Health, Ann. Repts., 1890 to date.

[f] Ohio State Board of Health, Ann. Repts., 1898 to date.

[g] Goss, Arthur, Bull. New Mexico Agr. Exper. Sta. No. 34, 1900.

[h] Forbes, R. H., and Skinner, W. W., Bull. Univ. Arizona Agr. Exper. Sta. No. 44, 1902.

1907, when several new stations were established for daily collection of water samples. Sixty-two stations were established in July, 1906, for the daily collection of samples of water from the principal rivers east of the one hundredth meridian, and arrangements were made for the collection of monthly samples from each of the Great Lakes and from St. Lawrence River. Shortly after that time a cooperative agreement was effected with the Illinois State Water Survey, the State Geological Survey of Illinois, and the engineering department of the University of Illinois for the purpose of investigating the quality of surface waters in that State, and 26 sampling stations were maintained for one year. A similar arrangement was made at the same time with the Kansas State Board of Health and the University of Kansas, and 24 stations for the collection of daily samples of river water were maintained in Kansas also for one year. The entire investigation was made under the direction of M. O. Leighton, chief hydrographer of the United States Geological Survey.

The samples collected in the New England, Middle, and East-Central States were shipped to Washington, D. C., where they were analyzed by R. B. Dole, M. G. Roberts, Chase Palmer, and W. D. Collins, of the Survey. Samples collected in the Southern States were shipped to Athens, Ga., and were analyzed in a branch laboratory at that point by J. R. Evans. When this laboratory was discontinued in May, 1907, part of the samples were transferred to a laboratory maintained at Norfolk, Va., where they were analyzed by W. D. Collins. The analyses of waters from the Middle-Western States, except Illinois and Kansas, were made in a branch laboratory at Iowa City, Iowa, by W. M. Barr, H. S. Spaulding, and Walton Van Winkle. The Illinois analyses were performed in the laboratory of the state water survey at Urbana, Ill., by W. D. Collins and C. K. Calvert. The Kansas samples were shipped to Lawrence, Kans., where they were tested in the laboratory of the University of Kansas by F. W. Bushong and A. J. Weith, under the direction of E. H. S. Bailey. The analyses of waters collected in California during 1906 were made in the Reclamation Service laboratory at Berkeley, by F. M. Eaton and P. L. McCreary, chemists detailed by the Geological Survey. The California analyses during 1907–8 were made in the same laboratory by Walton Van Winkle. The gage-height data, chiefly from field work under the direction of J. C. Hoyt, were collated by Herman Stabler.

ACKNOWLEDGMENTS.

So much voluntary assistance was accorded this work that reference by name to all the cooperators is impracticable. More than half the daily samples were collected absolutely free of charge under the direction of superintendents of waterworks and by other persons interested in the work. Special acknowledgment is due to the Weather Bureau, United States Department of Agriculture, for the collection of water samples in South Carolina, Georgia, and Alabama, and for the privilege of using several series of gage heights. Through the courtesy of the authorities in charge at the University of Iowa and the University of Georgia the Survey was furnished with laboratory space and other facilities for the efficient performance of analytical work. The University of California has furnished quarters for the laboratory at Berkeley since its establishment in the spring of 1905.

The cooperative agreements between the Geological Survey and the state authorities in California, Illinois, and Kansas have made possible much more extended studies of the quality of surface waters in those States than could otherwise have been undertaken.

METHODS OF EXAMINATION.

GENERAL DISCUSSION.

Discussion of the chemical analysis of waters has formed an appreciable part of technical literature for many years, and the subject has been attractive to original investigators everywhere. All sorts of methods for testing water have been recorded in scientific literature, and many of them have survived practical use. It seems, therefore, neither profitable nor particularly interesting to present in great detail the manipulative technique of water analysis, and this discussion has been confined more particularly to other phases of the problem. Though the literature in respect to methods is abundant, comparatively little is said regarding the magnitude of the errors in common practice, the limitations of the methods, and their general application; consequently, the following account gives only outlines of the methods that were employed, with notes of departures from usual practice, but it considers in detail the errors of the determinations and their general availability. It was known at the commencement of the investigation that surface waters are different from one another in their mineralization, and that the concentration of the waters changes from time to time. The object of the laboratory work was to measure those differences and changes in quantitative terms accurately enough for geologic and industrial interpretation. When a chemist is examining mineral waters that are sold as beverages, he usually considers time and expense to be secondary in importance and he is enabled to avail himself of the highest refinements of analytical skill; but when he is testing waters from rivers that may change 100 per cent in their mineralization while he is examining one sample, he is not justified in employing such accurate procedure, and the cost of it is prohibitive when a large number of samples is involved. Estimates of the amounts of the constituents within 5 to 10 per cent are usually accurate enough for industrial purposes, and that degree of refinement is sufficient for studying fluctuations in the quality of nearly all surface waters. It was felt that in the present investigation methods should be selected that would be sufficiently accurate, fairly inexpensive, rapid in execution, and productive of results available for the greatest number of purposes. With these facts in mind, therefore, procedures were adopted for estimating the principal acids and bases with moderate accuracy. None of the methods is new, and most of them have been recognized by competent authority.

COLLECTION OF SAMPLES.

One 4-ounce bottle of water was collected daily from the stream at each river station and was mailed to a designated laboratory. Empty bottles, thoroughly cleaned and inclosed in mailing cases, were supplied from the laboratories, and the samples were shipped as soon as possible after collection. The sampling stations were established with the object of obtaining water as nearly representative as possible of the average stream flow. If bridges were near at hand the bottles were filled in midstream by lowering them into the water in suitable holders, and intake pipes also were utilized at a large number of stations. Where neither of these arrangements could be effected the samples were collected either from a boat or from the bank by attaching the bottle to the end of a long pole. When the samples were received at the laboratories, they were united in sets of ten consecutive samples, thus making for analysis a composite sample measuring about 1,100 cubic centimeters.

DIVISION OF COMPOSITE SAMPLE.

After the composite sample had been thoroughly mixed by shaking, portions were in general withdrawn as follows: For determination of suspended solids and for filtration, 500 cubic centimeters; for determination of nitrates, 50 cubic centimeters; for determination of chlorine, 100 cubic centimeters; for determination of carbonates and bicarbonates, 50 cubic centimeters. This left 410 cubic centimeters for reserve in case of accident. It was necessary to alter these amounts for some rivers; the principal changes were decrease of the amounts used for determining suspended solids and nitrates and increase of the amount used for determining total solids and certain dissolved constituents. As changes of that sort affect the accuracy of the estimates, they are noted in accounts of the determinations and in discussion of the probable errors.

TURBIDITY.

The determination of turbidity was made on part or on all of the sample, and, as this determination does not prevent the use of the water for other procedures, the sample withdrawn for this purpose could be returned to the bottle if desired. Usually, however, the turbidity determination was made after all the others and on the reserve portion. The Jackson candle turbidimeter [a] was used for estimating turbidities between 100 and 1,000 parts per million. Estimates of turbidities exceeding 1,000 parts per million were made on a portion of the sample properly diluted with distilled water. All turbidities have been referred to the regular silica standard recommended by the American Public Health Association,[b] which can be prepared by suspending 1 gram of thoroughly dried Pear's precipitated fuller's earth [c] in 1 liter of distilled water. Such a suspension has a turbidity of 1,000 parts per million and it gives a reading of 2.3 centimeters in the standard turbidimeter. Turbidities below 100 parts per million were estimated by comparison with well-shaken dilutions of this silica standard in 250 cubic centimeter bottles of clear, colorless glass.

The turbidimeter consists of a glass tube surrounded by a cylindrical brass holder supported by a stand, in the center of which is a standard English candle. The glass tube is polished at the bottom and is graduated in millimeters from the bottom upward. The candle is automatically adjusted by a spring so that its flame is always 3 inches below the bottom of the glass tube. The water in which the turbidity is to be estimated is poured into the glass tube until the image of the lighted candle below is just obliterated. The depth of the water in the tube, read across the bottom of the meniscus, is referred to a table which gives the turbidity of the water in parts per million of silica. The instrument is convenient for laboratory work, and as its source of light is the standard candle it is ready for use at all times. The candle should be kept properly trimmed and not be in a draft. The most accurate results are obtained by making the readings in a dark room rapidly, before the liquid has become heated to any extent. The comparison between the readings of the standard turbidimeter and the corresponding parts per million of suspended silica is given in Table 1.

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[a] Leighton, M. O., The field assay of water: Water-Supply Paper U. S. Geol. Survey No. 151, 1905, pp. 26-29.

[b] Report of the committee on standard methods of water analyses to the laboratory section: Public Health Association, Pub. Health Papers and Repts., vol 30, pt. 2, 1905, p. 16; also Jour. Infect. Dis., No. 1, May, 1905, p. 16.

[c] Levy, E. C., A ready method for preparing a silica turbidity standard: Pub Health Papers and Repts. Am. Pub. Health Assoc., vol. 31, pt. 2, 1905, p. 149.

TABLE 1.—*Reduction of readings with turbidimeter to parts per million of silica.*

Depth in centimeters.	Turbidity (parts per million of silica).	Depth in centimeters.	Turbidity (parts per million of silica).	Depth in centimeters.	Turbidity (parts per million of silica).	Depth in centimeters.	Turbidity (parts per million of silica).
2.3	1,000	5.6	390	7.5	290	11.4	190
2.6	900	5.8	380	7.8	280	12.0	180
2.9	800	5.9	370	8.1	270	12.7	170
3.2	700	6.1	360	8.4	260	13.5	160
3.5	650	6.3	350	8.7	250	14.4	150
3.8	600	6.4	340	9.1	240	15.4	140
4.1	550	6.6	330	9.5	230	16.6	130
4.5	500	6.8	320	9.9	220	18.0	130
4.9	450	7.0	310	10.3	210	19.6	110
5.5	400	7.3	300	10.9	200	21.5	100

The only difficulty experienced in this determination was partial agglomeration of suspended clay in some samples, and this probably could have been obviated by determining turbidity immediately after uniting the daily samples. The probable limits of accuracy of the determination are such that the observations are recorded as in Table 2.

TABLE 2.—*Probable limits of accuracy in turbidity observations.*

[Parts per million.]

Turbidity.		Recorded to nearest—
Not less than—	Less than—	
....	50	Unit.
50	100	5 parts.
100	500	10 parts.
500	1,000	50 parts.
1,000	....	100 parts.

TOTAL SUSPENDED SOLIDS.

Total suspended matter was determined by use of a Gooch crucible as described by Kimberley and Hommon.[a] A mat about one-sixteenth of an inch thick of iron-free, ignited asbestos was prepared in the bottom of a porcelain Gooch crucible of 25 cubic centimeters capacity fitted to a 1-liter filtering flask. Suction was applied and the mat was washed with distilled water until the filtrate was clear, after which the crucible was dried at 180° C. for one-half hour, cooled, and weighed. After the crucible had been replaced on the filtering flask and the mat had been moistened with distilled water, a measured portion of the sample was passed through it. The residue was washed with distilled water, the filtrate being allowed to run into

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[a] Kimberley, A. E. and Hommon, H. B., The practical advantages of the Gooch crucible in the determination of the total and volatile suspended matter in sewage: Pub. Health Papers and Repts., Am. Pub. Health Assoc., vol. 31, pt. 2, 1905, p. 123.

the flask, and the crucible and residue were dried at 180° C. for one hour, cooled, and weighed. The difference in weight was computed to parts per million of suspended matter. Usually 500 cubic centimeters of water was used for this determination, but the suspended matter in many samples was so high that smaller portions had to be used, as little as 100 cubic centimeters being sometimes employed. Successful application of this procedure depends largely on the quality of the asbestos and on proper preparation of the mat. The asbestos should be finely shredded, thoroughly ignited, treated with strong hydrochloric acid for at least twelve hours, and then washed several times with distilled water. The mass should be shaken vigorously during these washings and allowed to settle about five minutes after each treatment, and the supernatant liquid containing the silt should then be decanted. Finally a fresh portion of water should be added and the mass should be shaken vigorously and about thirty seconds allowed for sedimentation of coarse particles. The asbestos should then be decanted from the sediment and preserved, suspended in water.

Amounts of suspended matter as small as 1 part per million were estimated, and the probable accuracy of the determination with a 500 cubic centimeter sample containing small amounts of suspended matter is within 1 part per million. The probable error is less than 10 per cent with suspended matters ranging from 100 to 5,000 parts per million. The determination presented no difficulties with most of the waters that were examined, but considerable trouble was experienced in removing the sticky "gumbo" that is suspended in many rivers of the Mississippi Valley. The material clogs the asbestos mat so badly that sometimes less than 50 cubic centimeters of water passes through. As small amounts as practicable were used in determining the suspended matter in such samples, and two or three crucibles were sometimes employed for filtering one sample. After the mat has become clogged, the surface of it can be loosened without injury by careful scraping with the point of a pencil or other sharp instrument, and filtration can proceed. It is also advantageous at times to use a thicker mat with coarse asbestos on the bottom and a finer quality on top. Loss of suspended matter by having it run through the mat occurred with some waters, but the amount of material that escaped was usually too small to constitute an appreciable source of error in the estimate of suspended solids.

TOTAL DISSOLVED SOLIDS.

Total dissolved matter was regularly determined on 500 cubic centimeters of the filtered sample, which was evaporated to dryness on the water bath in a tared platinum dish, dried at 180° C. for one hour, cooled and weighed. The residue was computed to parts per million of total dissolved solids. If the filtrate from the determination of suspended solids was not sufficient for estimating total solids, as in the tests of very muddy waters, the rest of the required amount was filtered through paper. The only notable difficulty experienced in making this determination was that of obtaining a clear filtrate for evaporation, especially with the muddy waters of the Southern States. Part of the suspended matter in some southern rivers is so fine that it is not removed by filtration through either an asbestos mat or paper. Though the amount of suspended solids lost in that manner is so small that it does not materially affect the estimate of suspended solids, the weight of the material, when it is compared with the relatively small amount of dissolved matter in many waters, is great enough to constitute an error in the estimate of dissolved solids, and the suspended matter also causes trouble in subsequent operations on the residue. During the first part of the work waters were filtered as well as possible through asbestos mats, then through paper mats, thus reducing the residual suspended matter in most samples to less than 5 parts per million. In later work it was found advisable to remove all traces of suspended matter from such samples by the use of alumina cream. This reagent was prepared by precipitating aluminum hydrate from a solution of aluminum sulphate by means of sodium hydrate. The precipitate was thoroughly washed with distilled water till it showed only traces of sulphates, alkalies, and alkalinity, and was then dissolved in hydrochloric acid, reprecipitated, and again thoroughly washed. One or two cubic centimeters of the aluminum hydrate was shaken with the filtrate from the suspended matter, after which the precipitant was removed by filtration through paper. A perfectly clear filtrate was obtained for evaporation by that treatment.

The determination of dissolved solids was usually made with 500 cubic centimeters of water, but 250 cubic centimeters was used for some of the western rivers that are very high in dissolved matter, and 700 cubic centimeters was taken for nearly all the waters collected at the southeastern stations during the latter half of the period, because it seemed advisable to have as much residue as possible for analysis. The difference between duplicate determinations of dissolved solids was usually about 1 part per million, when 500 cubic centimeters of the sample was evaporated and when about 100 parts per million of dissolved matter was present. The difference is likely to vary in amount more with waters containing considerable organic matter or alkali than with waters containing calcium salts.

The committee on standard methods of water analysis[a] recommend that suspended and dissolved solids be dried at 103° C. for one-half hour. Many chemists employ a temperature of 105° C., and others

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[a] Pub. Health Papers and Reports, Am. Pub. Health Assoc., vol. 30, pt. 2, 1905, p. 43.

dry residues in ovens surrounded by boiling water. Fresenius[a] recommends drying at 180° C. till the weight is constant, but as such long-continued desiccation was not practicable in these tests, the time was limited to one hour, though the temperature of 180° was adopted. The results seem to justify the use of the higher temperature. Practically all the water of crystallization and that mechanically occluded by residues of ordinary amount from waters of ordinary composition are driven off, and the organic matter is more or less carbonized and is greatly reduced in weight, though it is not completely destroyed. Drying at that temperature, therefore, makes comparison between the sum of the constituents and the amount of solids by actual determination more feasible than drying at the lower temperature. That the results of the analyses corroborate this belief is demonstrated on page 30 by comparisons between figures representing average total solids and those representing the average sum of the constituents. Another advantage of the higher temperature is that the results represent more nearly than those obtained at lower temperatures the conditions under which solids are deposited in steam boilers.

SILICA.

The residue from the determination of total dissolved solids, after being gently heated in a radiator until the organic matter was carbonized or wholly destroyed, was moistened with hydrochloric acid (1 to 1) and the dish, covered with a watch glass, was heated on the water bath for a few minutes. After treatment with acid had been repeated, if necessary, the sides of the dish were thoroughly rubbed down, and the mass was evaporated to dryness. The residue was again treated with 2 or 3 cubic centimeters of the acid and some distilled water, was heated on the water bath, and was finally separated from the solution by filtration through ashless filter paper. Little trouble was experienced in dissolving calcium sulphate in the residues. The insoluble part was thoroughly washed with hot water containing hydrochloric acid, ignited in a tared platinum crucible, cooled and weighed. It was then moistened with a few drops of sulphuric acid (specific gravity 1.84), and the silicia was volatilized with hydrofluoric acid, after which the crucible was again ignited, cooled and weighed. If the final residue exceeded 0.0005 gram, it was usually tested to discover its composition. The part volatilized by hydrochloric acid was computed to parts per million of silica (SiO_2). The nonvolatile residues were usually low, probably exceeding 0.0003 gram in less than 5 per cent of the analyses. They were highest in samples that were slightly turbid before evaporation, a condition indicating that part of the fine suspended matter left after filtration consisted of silicates that are not decomposed by hydrochloric acid.

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[a] Fresenius, C. R., Quantitative chemical analysis (transl. of 6th German ed.), vol. 2, 1904, p. 245.

IRON.

The iron in the filtrate from the determination of silica was oxidized by boiling the solution with a few drops of nitric acid (specific gravity 1.42). After a slight excess of ammonium hydrate had been added, the liquid was heated for a few minutes to precipitate the oxides of iron and aluminum, which were then removed by filtration and washed with hot water containing a little ammonium chloride. If it was desired to determine aluminum, the precipitate was dried, ignited, and weighed, then fused with fused sodium bisulphate. The resulting mass was dissolved in dilute sulphuric acid (1 to 3) and the solution was filtered and boiled vigorously for two or three minutes with 1 cubic centimeter of nitric acid (1.42). It was then cooled and diluted with water, and the iron in it was determined colorimetrically. The amount of iron as Fe_2O_3, subtracted from the weight of the combined oxides, gives the Al_2O_3, which multiplied by 0.53 gives the aluminum (Al). If, however, it appeared from the bulk of the precipitate that the combined oxides of iron and aluminum amounted to less than 5 or 6 parts per million the determination of aluminum was omitted. In that case the precipitate was not ignited but was dissolved immediately in hydrochloric acid, 1 cubic centimeter of nitric acid (specific gravity 1.42) was added, the solution was boiled, and the iron was determined colorimetrically.

The ferric solution was diluted to 90 cubic centimeters with distilled water, 10 cubic centimeters of a 2 per cent solution of potassium sulphocyanide was added, the solutions were thoroughly mixed, and the color that developed was compared immediately with iron standards in Nessler tubes measuring 17.5 centimeters to the 100 cubic centimeter mark. The depth of the colors that were compared did not exceed that equivalent to 0.001 gram of Fe, and if it was necessary to divide the solution that operation was always performed before the addition of potassium sulphocyanide. Colors equivalent to amounts of iron between 0.001 gram and 0.0001 gram of Fe were matched by comparison with colored slides, the manipulation and accuracy of which have been discussed by the writer.[a] Colors equivalent to amounts of iron less than 0.0001 gram of Fe were compared with permanent iron standards made by mixing solutions of cobaltous chloride and potassium platinic chloride in proper proportion.[b]

Methods for the colorimetric determination of iron have been extensively studied by Stokes and Cain,[c] who have ascertained the

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[a] Dole, R. B., Notes on the determination of iron: Pub. Health Papers and Repts., Am. Pub. Health Assoc., vol. 32, pt. 1, 1907, p. 183.

[b] Public Health Papers and Reports, Am. Pub. Health Assoc., vol. 30, pt. 2, 1905, p. 46; also Jackson, D. D., Tech. Quart. vol. 13, 1900, p. 315.

[c] Stokes, H. N., and Cain, J. R., On the colorimetric determination of iron with special reference to chemical reagents: Bull. Bur. Standards, U. S. Dept. Com. and Lab., No. 3, 1906, p. 115; also Jour. Am. Chem. Soc., vol. 27, 1905, p. 409; Chem. Abs., Am. Chem. Soc., vol. 1, 1907, p. 1955.

effect of certain substances and changes in technique on the intensity of the color that is developed in the sulphocyanate test. They also recommend several refinements in procedure. Special care was taken in the present investigation to make the estimate always in the same manner, and the iron group was separated from other components of the residue before the color comparisons were made. In nearly all the work the iron was precipitated from solutions representing 500 cubic centimeters of the sample, so that the probable accuracy of the estimates is somewhat greater than that of the estimates of iron usually made, for which 50 to 100 cubic centimeters of the sample is used.

CALCIUM.

The filtrate from the determination of iron was diluted to a definite volume, usually 100 cubic centimeters, and was divided into two equal parts. One part was used for the determination of calcium and magnesium and the other part for the determination of sulphates and alkalies. After the portion for the determination of calcium and magnesium had been heated to boiling in a beaker, it was made slightly alkaline with ammonium hydrate; ammonium oxalate in the form of hot 5 per cent aqueous solution was then added to it in sufficient amount to convert all the calcium and magnesium into oxalates. Ten cubic centimeters was usually added, but more was used if the figure for total solids indicated that this amount was not enough. The mixture was digested not less than three hours in order to precipitate all the calcium and to dissolve the magnesium oxalate. The solution was filtered through Schleicher and Schüll white ribbon paper No. 589, and the precipitate was washed with hot water containing a little ammonia, no special care being taken to transfer all the calcium oxalate from the flask to the funnel. The flask in which the precipitation was made was then placed under the funnel, and while the precipitate was agitated by a stream of hot water from a wash bottle dilute sulphuric acid (1 to 3) was poured on till the precipitate was completely decomposed and dissolved, after which the filter paper was thoroughly washed with hot water. If this operation is skillfully performed, the calcium precipitate is easily dissolved and 20 cubic centimeters of the dilute acid is amply sufficient for the purpose. The solution of calcium was diluted to about 100 cubic centimeters with hot distilled water and was titrated with N/20 potassium permanganate.

This method, described by Sutton,[a] was entirely satisfactory. The principal objections that had been advanced against its use are the difficulty of dissolving calcium oxalate in sulphuric acid and the

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[a] Sutton, Francis, A systematic handbook of volumetric analysis, 9th ed., Philadelphia, 1904, p. 168.

errors introduced by traces of oxalic acid and organic matter. Solution of the precipitate is easy if it is performed in the manner just outlined, and this procedure is preferable to that recommended by Sutton, of punching a hole in the filter paper and washing the precipitate into the flask. The filter paper should never be digested in sulphuric acid, because the oxidizing power of the solution is unwarrantably increased by such treatment. The results of several experiments for the purpose of determining the errors due to solution of filter paper and to traces of oxalic acid indicate that it is possible to estimate calcium volumetrically within 1 part per million, when 250 cubic centimeters of the sample is used for the test. Schleicher and Schüll filter papers Nos. 595, 589, white ribbon, and 590 were treated exactly as if a calcium test were being made. Twenty cubic centimeters of dilute sulphuric acid was passed through each filter paper in a funnel, and the papers were then washed with hot distilled water until the filtrate amounted to about 100 cubic centimeters. When the acid solutions were titrated with N/20 potassium permanganate, the average amount of permanganate consumed by the solutions passed through No. 595 papers was 0.10 cubic centimeter; through No. 589, 0.09 cubic centimeter; and through No. 590, 0.06 cubic centimeter. The highest amount, 0.10 cubic centimeter, is equivalent for a 250 cubic centimeter sample to 0.4 part per million of calcium, an amount so small that it can be disregarded. In another experiment for the purpose of estimating the amount of oxalic acid that might be retained by the papers, 10 cubic centimeter lots of a 5 per cent solution of ammonium oxalate with 4 drops of nitric acid (specific gravity 1.42) and enough ammonium hydrate to make the mixture slightly alkaline were heated to boiling in an Erlenmeyer flask and filtered through different filter papers, which were afterwards washed with hot water till the filtrates failed to show the presence of chlorides. The filter papers were then treated with 20 cubic centimeters of sulphuric acid and washed, and the solutions were titrated with N/20 potassium permanganate. The average consumption of permanganate with No. 595 papers was 0.19 cubic centimeter; with No. 589 papers, 0.08 cubic centimeter; and with No. 590 papers, 0.08 cubic centimeter. The slight increase of permanganate for No. 595 papers over that used in the previous experiment is probably due to disintegration of this coarse-grained paper during washing. When samples of the three papers were torn into small pieces and were boiled for an hour in a 5 per cent sulphuric acid solution, the consumption of permanganate was notably increased, the amounts ranging from 0.2 to 0.3 cubic centimeter, but boiling the filter papers in sulphuric acid is not advised in the procedure and it is not necessary. If the precipitate is dissolved by pouring hot water and dilute sulphuric acid through the paper, the consumption of permanganate solution by organic matter dissolved from the paper and by traces of oxalic acid left in it apparently does not exceed 0.10 cubic centimeter, an amount equivalent to 0.4 part per million of calcium in the regular procedure. The oxalic acid that may be occluded by the calcium oxalate was not estimated, but it is evident that this amount varies with the volume of precipitate, and the percentage of error is, therefore, no higher for low than for high calciums. The results of experiments comparing volumetric with gravimetric determinations also justify the conclusion that the volumetric method for estimating calcium is sufficiently accurate for general water analysis.

MAGNESIUM.

The filtrate from the calcium, having been made slightly acid with hydrochloric acid, was concentrated till the salts began to crystallize. An excess of a 10 per cent solution of sodium ammonium phosphate was added, and the liquid was allowed to cool. Finally it was made distinctly alkaline with ammonium hydrate and set aside not less than six hours in order to insure complete precipitation of the magnesium. Two cubic centimeters of strong ammonia (specific gravity 0.90) was usually sufficient in a volume of 50 to 75 cubic centimeters. Attention has been called by Gooch and Austin[a] to the fact that the large excess of ammonia which is so commonly added is distinctly disadvantageous. The precipitate was separated by filtration and was washed by decantation with water containing a little ammonia, till the excess of precipitant was removed. The precipitate in the beaker and on the paper was dissolved in 5 cubic centimeters of 5 per cent acetic acid and about 40 cubic centimeters of hot water. Five cubic centimeters of a 5 per cent ammonium acetate solution was added and the solution was titrated with standard uranium solution, care being taken to boil the solution vigorously before noting the final end point, which is found by adding a drop of the liquid to a drop of half-saturated solution of potassium ferrocyanide on a white porcelain plate.

This improvement on Sutton's method[b] of dissolving and titrating the phosphoric acid was devised and tested by M. G. Roberts. It is important to have a constant amount of solution, as the end point varies somewhat with the volume. The quantity of phosphate that is titrated should be such that 1 to 20 cubic centimeters of uranium solution may be added. The method was tested with satisfactory results by comparison with Sutton's procedure and with the usual gravimetric method.[c]

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[a] Am. Jour. Sci., 4th ser., vol. 7, 1899, p. 187; also Bull. U. S. Geol. Survey No. 176, 1900, p. 65.

[b] Sutton, Francis, A systematic handbook of volumetric analysis, 9th ed., Philadelphia, 1904, p. 294.

[c] Fresenius, C. R., Quantitative chemical analysis (trans. of 6th German ed.), vol. 1, 1904, p. 275.

SULPHATE RADICLE.

The usual gravimetric method[a] was employed for the determination of sulphates. One-half the filtrate from the determination of iron was slightly acidulated with hydrochloric acid and was heated nearly to boiling. Excess of barium chloride in hot 10 per cent solution was then added, after which the liquid was digested on the hot plate for at least thirty minutes. The precipitate of barium sulphate was removed by filtration, thoroughly washed with hot water, dried, ignited, and weighed. The amount of sulphates as parts per million of SO_4 was computed from that weight.

SODIUM AND POTASSIUM.

The filtrate from the sulphate determination was treated with ammonia and ammonium carbonate and was filtered. The filtrate was evaporated to dryness on the water bath, heated to expel ammonium salts, and digested with a few cubic centimeters of distilled water. Magnesium was precipitated with barium hydrate, the solution was again filtered, and the precipitate was washed with hot water. The filtrate from this operation was heated, and barium and calcium were precipitated with ammonium carbonate and were removed by filtration, after which the filtrate was evaporated to dryness and heated to expel ammonium salts. The residue was digested with 4 or 5 cubic centimeters of water, warmed, and treated again with ammonia and ammonium carbonate to remove traces of barium and calcium. The solution was then filtered into a small porcelain dish and evaporated to dryness. The residue was heated nearly to fusion and weighed. The alkaline chlorides in the dish were dissolved in a little water and were filtered through an ashless filter paper, which was then washed, ignited in the porcelain dish, and weighed. The difference in weights was calculated to "sodium and potassium," the molecular weight 58 being used for the material. The error introduced by disregarding potassium is discussed on page 33. The procedure is similar to that recommended by Fresenius,[b] and it requires no special comment except that care was taken to insure complete removal of impurities. If the third treatment with ammonia and ammonium carbonate produced an appreciable amount of precipitate, the operation was repeated till the last treatment revealed only traces of impurities.

The sodium-potassium ratio of some of the river waters was determined quarterly. The solutions of alkaline chlorides from the ten-day composite samples representing a three months' period were united and repurified in accordance with the procedure just outlined.

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[a] Fresenius, C. R., op. cit., vol. 1, 1904, p. 434.

[b] Fresenius, C. R., op. cit., vol. 2, 1905, p. 249.

The pure chlorides were then evaporated nearly to dryness in a Jena dish with sufficient platinic chloride to convert the alkalies into their platinum double salts. The residue was treated with 80 per cent alcohol, and the potassium platinic chloride, removed by filtration through an asbestos mat in a small filter tube, was washed with dilute alcohol, dried in a steam oven, and weighed. By dissolving the potassium platinic chloride in hot water, drying, and again weighing the filter tube, the difference in weight representing the mass of the potassium double salt could be found and computed to parts per million of potassium (K).

CARBONATE AND BICARBONATE RADICLES.

Estimates of the carbonate and bicarbonate radicles were made on the same 50 cubic centimeter sample of the water, which was filtered if necessary. Ten drops of phenolphthalein were added to the measured sample in a porcelain dish of convenient size and the sample was titrated with N/50 potassium acid sulphate solution. The number of cubic centimeters of acid used, multiplied by 24, equals parts per million of the carbonate radicle (CO_3). Two drops of methyl orange were added to the same liquid and the titration was continued. The total amount of acid used, minus twice that required for the first end point, equals that equivalent to the bicarbonates present. The latter figure, expressed in cubic centimeters and multiplied by 24.4, equals parts per million of the bicarbonate radicle (HCO_3). The water was sometimes diluted or a larger amount was taken for titration, but it could not, of course, be concentrated. This procedure is recommended by Cameron[a] and it gave results that are sufficiently satisfactory. The balance between the different forms of carbonic acid in solution is variable, depending largely on concentration, temperature, and pressure. It is fairly certain that many of the waters which gave positive tests for normal carbonates do not contain that form of carbonic acid in nature. It is unjustifiable, however, to assume from the data at hand that no natural stream waters contain normal carbonates, and it is equally impossible definitely to decide which ones do and which ones do not contain them. Consequently the carbonates and bicarbonates are reported exactly as they were determined, but CO_3 has been computed to HCO_3 in calculating the average condition of streams if there were only a few scattered positive tests for normal carbonates. All such recomputations are noted in the tables of analyses, and the figures involved bear the following footnote: "Abnormal; computed as HCO_3 in the average."

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[a] Cameron, F. K., Bull. Bur. Soils, U. S. Dept. Agr., No. 64, 1900, p. 63; also Jour. Am. Chem. Soc., vol. 23, 1900, p. 471.

CHLORINE.

The usual volumetric procedure was employed for the determination of chlorine,[a] and the concentrations of solution recommended by Jackson and described by Leighton[b] were used in order that the results might be comparable with normal chlorine determinations. One hundred cubic centimeters of the sample was usually concentrated to 25 cubic centimeters in a porcelain dish on the water bath at a time when hydrochloric acid fumes were not prevalent in the laboratory. If a large amount of the element was present a smaller sample was taken and duplicate determinations were made. After the sample had been concentrated, 1 cubic centimeter of a 5 per cent potassium chromate solution was added and the inside of the dish was thoroughly rubbed down with a rubber policeman. Standard silver nitrate was then added from a burette, till the first faint reddish tint appeared. Each analyst determined by experiment with chlorine-free water the amount of silver nitrate necessary to produce a red coloration detectible by him under regular conditions, and he subtracted that amount from the results of his titrations. The chlorine (Cl) in parts per million was then computed. Samples that were very turbid or highly colored were filtered or were clarified by treatment with alumina cream. When very large amounts of chlorine were present, gravimetric determinations were made by precipitating the chlorine as silver chloride in nitric acid solution, removing the precipitate by filtration through an asbestos mat in a Gooch crucible, drying in a steam oven, and weighing.

NITRATES.

The phenolsulphonic acid method was used for the determination of nitrates.[c] As practically all the surface waters that were tested contained amounts of color sufficient to interfere materially with the color comparison in this test, it was necessary to decolorize the samples before evaporation. A small amount of alumina cream was shaken with 75 to 80 cubic centimeters of the sample in a 4-ounce bottle and allowed to settle, after which 50 cubic centimeters of the clear supernatant liquid was removed either by filtration or by decantation and was evaporated to dryness in a porcelain dish on the water bath with a few drops of sodium carbonate solution. One cubic centimeter of phenolsulphonic acid was quickly and thoroughly rubbed over the residue in the dish, after which 10 cubic centimeters of distilled water was added and the solution was stirred till it was thoroughly mixed. After enough ammonium hydrate to render the

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[a] Pub. Health Papers and Reports, Am. Pub. Health Assoc., vol. 30, pt. 2, 1905, p. 66; also Sutton, Francis, A systematic handbook of volumetric analysis, 1904, p. 451.

[b] Leighton, M. O., Field assay of water: Water-Supply Paper U. S. Geol. Survey No. 151, 1905, p. 49.

[c] Public Health Papers and Reports, Am. Pub. Health Assoc., vol. 30, pt. 2, 1905, p. 40.

liquid alkaline had been added, the solution was transferred to a Nessler tube and was diluted to the 100 cubic centimeter mark with distilled water. The yellow color developed by the nitrates was compared with similar shades in Nessler tubes containing solutions of known amounts of potassium nitrate that had been treated with phenolsulphonic acid and ammonia. The results are reported as parts per million of the nitrate radicle (NO_3), not as N, the customary basis in sanitary work. Though this procedure is comparatively accurate for estimating the amount of nitrogen actually present as nitrates at the time of the test, it must be emphatically stated that the reported nitrate figures do not represent the amount of nitrogen present as nitrates in the stream waters when the samples were collected. Practical considerations made it impossible to perform the test less than ten days after some of the samples had been collected and the estimate was made in a great many samples after a period of three to eight weeks, or even more, had elapsed. Inasmuch as this length of time was sufficient for marked changes in the amount of nitrates, the value of the results is problematical. The determination was made in order to complete the estimation of acid radicles that were present in appreciable amount, and though its value as an index of the condition of the stream water at the time the samples were taken is probably not great, the comparative amounts in the different streams may furnish some information regarding the amount of organic matter that is present, and this feature is the excuse for the presentation of the nitrate figures in the analytical data.

TOTAL ACIDITY.

If the water under examination contained free mineral acid a convenient amount of the sample, filtered if necessary, was titrated with N/10 sodium carbonate in the presence of methyl orange indicator. If 50 cubic centimeters of water is titrated, the number of cubic centimeters of N/10 alkali used, multiplied by 98, gives the result in parts per million of free sulphuric acid (H_2SO_4).

TOTAL IRON.

As most of the iron in many river waters forms part of the suspended matter rather than part of the matter in solution, a figure representing to some extent the total amount of iron was estimated at some laboratories. The test was made by boiling vigorously 50 cubic centimeters of the unfiltered sample ten or fifteen minutes with 1 cubic centimeter each of concentrated nitric and hydrochloric acids. The liquid was then filtered, and the iron in it was determined colorimetrically by the sulphocyanide method. The figure obtained in this manner is only approximate, as all the iron in the suspended matter is probably not dissolved by this treatment.

PREPARATION OF SOLUTIONS.

TWENTIETH-NORMAL POTASSIUM PERMANGANATE.

About 2 grams of potassium permanganate crystals were dissolved in freshly boiled distilled water, and the solution was filtered through glass wool and diluted to 1 liter. The strength of the solution was determined by titration against iron. Three portions of pure iron wire, each weighing about 0.2 gram, were dissolved in 125 cubic centimeter Erlenmeyer flasks in 40 cubic centimeters of water and 10 cubic centimeters of concentrated sulphuric acid. The solutions were cooled rapidly to about 60° C. and diluted to 50 cubic centimeters with freshly boiled distilled water. One portion was titrated with the permanganate solution, which was then diluted to one-twentieth normal strength, and the other two portions were used to verify the accuracy of the dilution. The amount of permanganate necessary to produce a detectible red coloration with 10 cubic centimeters of concentrated sulphuric acid and 40 cubic centimeters of water was subtracted from each titration, and the iron wire was considered to be 99.6 per cent pure Fe. The strength of the permanganate solution was verified in many tests also by titration against potassium tetraoxalate and against Iceland spar. One cubic centimeter of N/20 potassium permanganate is equivalent to 0.001 gram of calcium (Ca) from calcium oxalate.

AMMONIUM ACETATE.

Forty-four cubic centimeters of ammonium hydrate (specific gravity 0.90) and 37 cubic centimeters of glacial acetic acid were dissolved in 1 liter of distilled water.

STANDARD SODIUM AMMONIUM PHOSPHATE SOLUTION.

In 1 liter of distilled water 8.4507 grams of sodium ammonium phosphate was dissolved. One cubic centimeter of this solution should be equivalent to 0.001 gram of magnesium (Mg), and the strength was always verified by gravimetric determination of the phosphate radicle.

STANDARD URANIUM SOLUTION.

About 21 grams of uranium nitrate was dissolved in 800 cubic centimeters of distilled water, enough ammonium hydrate to produce a slight turbidity was added, then 50 grams of glacial acetic acid was added, and the whole was diluted to 1 liter with distilled water. Ten cubic centimeters of the solution of sodium ammonium phosphate was next mixed in a beaker with 5 cubic centimeters of ammonium acetate and 35 cubic centimeters of distilled water. After this solution had been heated to boiling the uranium solution was added till the faintest brown coloration appeared, when a drop of the liquid was mixed with a drop of half-saturated solution of potassium ferrocyanide on a white porcelain slip. As soon as the coloration appeared the solution was diluted to 50 cubic centimeters with boiling water and the test was repeated. If the operation had been properly conducted no red coloration appeared in the second test, and the addition of two or three drops of uranium solution was necessary before the final reading. The amount of uranium solution necessary to produce a detectible red coloration in a blank test was subtracted from all titrations. The uranium solution was then diluted till 1 cubic centimeter of it was exactly equivalent to 1 cubic centimeter of the solution of sodium ammonium phosphate, and the accuracy of the dilution was verified by additional titrations against sodium ammonium phosphate.

METHYL ORANGE.

One gram of methyl orange was dissolved in 1 liter of distilled water and the solution was filtered. As the accuracy of the bicarbonate estimate depends largely on the quality of the indicator, special care was taken to select a satisfactory article. Several samples of methyl orange were tested, and the one that gave the most satisfactory results was used exclusively for the estimates.

PHENOLPHTHALEIN.

Ten grams of phenolphthalein was dissolved in 500 cubic centimeters of alcohol (specific gravity 0.834), and the solution was diluted to 1 liter with distilled water.

FIFTIETH-NORMAL POTASSIUM ACID SULPHATE.

About 3 grams of potassium acid sulphate was dissolved in 1 liter of freshly boiled distilled water. A portion of the solution was titrated against some other carefully standardized solution, using methyl orange indicator, and the strong solution was then diluted to one-fiftieth normal strength with distilled water. Normal sulphuric acid, which had been tested both by titration against alkali and by precipitation with barium chloride, was usually employed as a basis for standardization.

POTASSIUM CHROMATE SOLUTION.

The solution of potassium chromate was prepared by dissolving 50 grams of the pure salt in 1 liter of distilled water and then adding sufficient silver nitrate to precipitate all the chlorine present and turn the solution slightly reddish. This was allowed to stand, and the clear solution was then obtained by filtering or decanting.

STANDARD SALT SOLUTION.

A solution containing 0.001 gram of chlorine in each cubic centimeter was made by dissolving 1.648 grams of fused sodium chloride in 1 liter of distilled water free from chlorine.

STANDARD SILVER SOLUTION.

In 1 liter of distilled water free from chlorine was dissolved 2½ grams of crystallized silver nitrate. Water or strong silver nitrate was added to this solution until by actual titration 10 cubic centimeters of it was equivalent to 5 cubic centimeters of the standard salt solution. One cubic centimeter of the solution of silver nitrate was then equivalent to 0.0005 gram of chlorine.

STANDARD NITRATE SOLUTION.

In 1 liter of distilled water was dissolved 1.63 grams of potassium nitrate. One cubic centimeter of this solution contains 0.001 gram of NO_3. Fifty cubic centimeters of this strong solution was cautiously evaporated to dryness on the water bath, and the residue was moistened equally and thoroughly with 2 cubic centimeters of phenolsulphonic acid and was diluted to 1 liter with distilled water. One cubic centimeter of this solution contains 0.00005 gram of NO_3. The necessary amounts of this solution, which was used as a standard, were made alkaline with ammonia as needed and were diluted in Nessler tubes to 100 cubic centimeters with distilled water.

PHENOLSULPHONIC ACID.

Seventy-five grams of pure melted phenol was added slowly with constant agitation to 925 grams of sulphuric acid (specific gravity 1.84) in a liter flask. The flask, covered with a watch glass, was then heated on a water bath for six hours to insure complete sulphonation of its contents.

TENTH-NORMAL SODIUM CARBONATE.

A strong solution of the purest crystallized sodium carbonate that could be obtained was titrated against normal sulphuric acid and diluted to one-tenth normal strength, which was verified also by titration against N/50 potassium acid sulphate. One cubic centimeter of N/10 sodium carbonate is equivalent to 0.0049 gram of sulphuric acid.

DEPARTURES FROM REGULAR PROCEDURES.

GENERAL DEPARTURES.

The regular procedures were followed systematically in most of the analytical work, the only exceptions being in some matters of minor detail. Calcium and magnesium were estimated gravimetrically for short periods at some of the laboratories, and the amount of water used for the different determinations, especially for suspended solids, was changed at will in order to obtain the best working conditions.

ANALYSES OF MISSISSIPPI RIVER.

The daily samples of water from Mississippi River at New Orleans were united in sets of seven instead of ten. The most important departure in analysis of the composites was in regard to suspended solids, from which the water was freed by filtering it with suction through Berkefeld filter tubes; the effect of passing the water of Mississippi River through these stones was practically negligible so far as the mineral content was concerned, because large quantities of water were available. The residue from evaporating 100 cubic centimeters of the filtered water was dried at 110° C. instead of 180° C. and was weighed for total dissolved solids. Silica, oxides of iron and aluminum, calcium, and magnesium were determined gravimetrically on the residue from 2 liters of water, and from 2 to 4 liters was taken for estimation of sulphates and the alkalies.

ANALYSES OF ANDROSCOGGIN RIVER.

Spot samples were collected weekly from Androscoggin River, and the small amount of mineral matter in the water necessitated several refinements in method. The water was nearly free from suspended matter except flocculent particles, from which a clear liquid was decanted after sedimentation. Three liters of the clear water was evaporated to dryness, and the residue was dried below red heat till it became white, before it was weighed. It was then treated with hydrochloric acid; and silica, oxides of iron and aluminum, and calcium were determined gravimetrically. One-half the filtrate was used for gravimetric estimate of magnesium and the other half for gravimetric estimate of sulphates and alkalies. Sodium and potassium were separated by treatment with platinic chloride. The carbonate and bicarbonate radicles were not estimated; consequently no values have been reported for them. The amount of bicarbonates equivalent to the average excess of the bases over sulphates and chlorine in this water is 20 parts per million, which, added to the sum of the dissolved constituents that were estimated, gives 48 parts per million. The latter figure is probably more nearly comparable with the figures representing total dissolved solids at 180° C. than the average of the determinations of the residue reported on page 48.

ANALYSES OF SOUTHERN RIVERS.

Some river waters of the Southeastern States are characterized at certain seasons of the year by suspended matter so finely divided that ordinary methods of filtration fail to remove it, and as a consequence much trouble was experienced in obtaining a clear filtrate for determination of the dissolved constituents. The difficulty was finally overcome by treatment with aluminum hydrate as described on page 14, but between November, 1906, and June, 1907, the procedure in the following paragraph was used for waters of this character.

A convenient amount of the samples was filtered through an asbestos mat in a Gooch crucible for the determination of suspended matter, and the filtrate, clarified later if necessary, was used for estimation of nitrates, chlorine, carbonates, and bicarbonates. A much clearer liquid was obtained by filtering 750 cubic centimeters of the sample through a mat of ashless paper pulp in a Gooch crucible, and the amount of suspended iron in the residue on the mat was determined volumetrically. Two-thirds of the filtrate was evaporated to dryness in acid solution in a porcelain dish, and the residue was used for estimation of silica, iron, calcium, and magnesium. One-third of the filtrate was evaporated to dryness without acid in a platinum dish, and the residue was dried and weighed for determination of dissolved solids, after which it was used for estimation of sulphates and alkalies.

PROBABLE ACCURACY OF ESTIMATES.

THEORETICAL LIMITS OF ACCURACY.

The theoretical limits of accuracy in the procedures have been estimated by consideration of the amounts of water used for the determinations, the probable accuracy of the balances, burettes, and standard solutions that were employed, the impurities in the reagents, and the manipulative errors to which the results were subject. Such estimates of accuracy, apart from some influences that may be computed mathematically, are more or less approximate, because the magnitude of the errors may perhaps be decreased by practicing, or increased by failing to practice, certain refinements in the analytical methods; but they are introduced for the purpose of showing the number of figures that may be significant in the results. The probable limits of accuracy are given in Table 3, in which the first column gives the name of the determination, the second column the amount of water usually taken, and the third column the theoretical minimum amount that can be estimated with any precision when the constituent is present in comparatively small amount. The minimum of accurate estimate increases with the actual mass of the substance.

TABLE 3.—*Limits of accuracy of the determinations.*

Name of determination.	Amount of water usually taken.	Minimum limit of accuracy.	Name of determination.	Amount of water usually taken.	Minimum limit of accuracy.
Turbidity		3	Sodium and potassium (Na+K)	250	0.5
Suspended matter	500	1	Carbonate radicle (CO_3)	50	2.5
Total solids	500	1	Bicarbonate radicle (HCO_3)	50	2.5
Silica (SiO_2)	500	.6	Sulphate radicle (SO_4)	250	.5
Iron (Fe)	500	.05	Chlorine (Cl)	100	.5
Calcium (Ca)	250	.8	Nitrate radicle (NO_3)	50	.09
Magnesium (Mg)	250	.8			

The assigned limits of accuracy probably err by being too small instead of too large. The way in which they were evolved may be illustrated by the determination of calcium. In the regular procedure the calcium in 250 cubic centimeters of the sample is precipitated with ammonium oxalate in alkaline solution, heated, removed by filtration, dissolved in sulphuric acid, and titrated with N/20 potassium permanganate. The estimate is subject to certain errors, among which may be mentioned errors in measuring the amount of water to be used, in standardizing the permanganate solution, and in measuring the permanganate solution; errors due to the use of an improper end point, to organic matter from the filter paper, to organic matter in the sample, and to oxalic acid retained by the paper or occluded by the precipitate; and errors due to solubility of calcium oxalate in the precipitating solution and to retention of other oxalates in the precipitate. An error of 0.1 cubic centimeter in measuring 10 or 20 cubic centimeters of permanganate solution, which is not unlikely, would be equivalent to 0.4 part per million of calcium for a 250 cubic centimeter sample. The filter paper may contribute oxidizing matter equivalent to an amount of permanganate between 0.03 and 0.10 cubic centimeter, averaging 0.08 cubic centimeter, or 0.32 part per million of calcium. It would be surprising, indeed, if the addition of the positive and negative errors due to other sources of inaccuracy did not contribute an error equivalent to 0.08 part per million. Consequently the estimate of calcium in 250 cubic centimeters of water should not be considered accurate within 0.8 part per million when ordinary amounts of the substance are present, and it would probably be in greater error when large amounts of calcium are present or when smaller amounts of water are used for the determination.

It is probable that some of the analytical results are subject to even greater inaccuracy. The estimates in the third column of Table 3 are, however, given more for the purpose of demonstrating the limit to which reliance should be placed on the analyses than for any other purpose, and this consideration of the probable accuracy of the estimates leads to the interesting subject of the number of figures that may be considered significant in the results. The committee on standard methods of water analysis of the American Public Health Association[a] has recommended that when the results show quantities above 10 parts per million no decimals be reported; that when results are between 1 and 10 parts one decimal only should be reported, and that when results are between 0.1 and 1 part two decimals only should be reported. These rules, though they were suggested especially for sanitary work, have much merit when applied to all water analyses; and if they were generally adopted these limitations would render unnecessary much unjustifiable figuring and would still leave results sufficiently accurate for all practical purposes. The recommendations of the committee were adopted in the present investigation, and though they do not coincide exactly in all respects with the minimum limits of accuracy recorded in Table 3, it was thought best to follow them rigidly rather than to attempt to adjust the results of each determination to an estimate that depends more or less on judgment rather than on accurate determination by analytical methods.

COMPARISON OF THE SUM AND TOTAL SOLIDS.

The probable accuracy of the analyses can be checked by comparing the sum of the constituents with the figure for total solids and by comparing the combining weights with the acids and the bases with each other. The first comparison shows the advantage of drying the total residue at 180° C. Some organic matter is left in the residue at that temperature, depending largely on its nature, and a little water sometimes remains. Part of the carbonates are probably decomposed, especially if much silica is present, and all the half-bound carbonic acid is volatilized. If much magnesium chloride is formed in the residue, part of the chlorine probably escapes. Usually, however, these sources of error tend to neutralize one another, and a fairly good agreement is found between total solids and the sum of the dissolved constituents minus the half-bound carbonic acid. In order to illustrate this point, 800 analyses made at one laboratory by several chemists have been grouped according to the magnitude of the figure representing total dissolved solids, and the average difference between the sum of the constituents and this total has been computed for each group. The results are tabulated below. The last two lines of this table have been supplied from work done at another laboratory because the determinations of high solids at the first laboratory were not sufficiently numerous to justify computation of averages.

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[a] Public Health Papers and Reports, Am. Pub. Health Assoc., vol. 30, pt. 2, 1905, p. 26.

TABLE 4.—*Average difference between dissolved solids and the sum of the constituents.*

[Parts per million.]

Dissolved solids.		Average difference (plus or minus).
Not less than—	Less than—	
....	50	4
50	100	5
100	200	5
200	300	6
300	400	9
400	1,000	25
1,000	....	60

The figure for total solids is the higher in more than 90 per cent of the analyses, a condition showing the presence of organic matter and undetermined constituents. Ten parts excess of total solids is not uncommon, especially in highly colored waters, but 10 parts excess of the sum of the constituents is unusual in waters running below 200 parts per million of solids, and results of that character should be carefully examined for error. The excess of total solids over the sum of the constituents may be 10 to 15 parts in a sample containing 100 to 200 parts per million of solids, if much organic matter is present; it may be higher in highly sulphated or chlorinated waters, especially with a high sodium base, but it does not usually exceed 10 to 15 parts in ordinary carbonated waters, even in those containing as much as 300 parts of total solids.

The average differences between total solids and the sum of constituents in analyses of waters that had been treated with aluminum hydrate as described on page 14 were somewhat less than the differences on untreated waters from rivers containing water of similar character, and excesses of the sum over the total solids were somewhat more common. Inasmuch as the waters treated in this manner were high in organic matter, most of which was removed by the aluminum hydrate, the facts just detailed seem to corroborate the belief that much of the difference between total solids and the sum is due to organic matter; but the evidence on this point is not conclusive.

ERROR OF COMBINING VALUES.

METHODS OF COMPUTATION.

The accuracy of the analyses was also checked by comparing the combining weights of the acidic and the basic radicles with each other. The constituents ordinarily present in natural waters in appreciable amount were quantitatively determined by analysis; therefore, the difference between the sum of the combining weights of the acidic radicles and the sum of the combining weights of the basic radicles is a good test of the accuracy of the analysis. Each radicle expressed in parts per million was multiplied by its valence and the product divided by its molecular weight. The quotient is the combining weight of the radicle in parts per million; or to prevent confusion it may be called the combining value. The difference between the sum of the acidic and the sum of the basic values, multiplied by 100, then divided by the sum of all the values, represents the percentage of error of the combining values. Factors for computing the combining value from the amount of the radicle are given in Table 5.

TABLE 5.—*Factors for computing combining values.*

	Factor.		Factor.		Factor.
Iron (Fe)	0.0358	Potassium (K)	0.0255	Sulphate radicle (SO_4)	0.0208
Aluminum (Al)	.1107	Carbonate radicle (CO_3)	.0333	Nitrate radicle (NO_3)	.0161
Calcium (Ca)	.0499	Bicarbonate radicle (HCO_3)	.0164	Chlorine (Cl)	.0282
Magnesium (Mg)	.0821				
Sodium (Na)	.0434				

The method of computation is illustrated in Table 6, in which the calculations are made on an analysis of Susquehanna River.

TABLE 6.—*Illustration of methods of computing probable accuracy of analysis.*

I. Analytical statement.		II. Computation of error.			
	Parts per million.		Parts per million.	Factor.	Combining value.
Silica (SiO_2)	9.0				
Iron (Fe)	.05				
		Bases:			
Calcium (Ca)	26	Calcium (Ca)	26	× 0.0499	=1.30
Magnesium (Mg)	6.4	Magnesium (Mg)	6.4	× .0821	= .52
Sodium and potassium (Na+K).	12	Sodium and potassium (Na+K).	12	× .0434	= .52
					2.34
		Acids:			
Carbonate radicle (CO_3)	32.0	Carbonate radicle (CO_3)	0.0	× 0.0333	=0.00
Bicarbonate radicle (HCO_3) 66; equivalent amount of CO_3.		Bicarbonate radicle (HCO_3).	66	× .0164	=1.08
Sulphate radicle (SO_4)	42	Sulphate radicle (SO_4)	42	× .0208	= .87
Chlorine (Cl)	9.8	Chlorine (Cl)	9.8	× .0282	= .28
Nitrate radicle (NO_3)	7.0	Nitrate radicle (NO_3)	7.0	× .0161	= .11
					2.34
Sum of constituents	144				
Total solids	142	Percentage of error	$\frac{100(2.34-2.34)}{2.34+2.34}$		=0.0
Difference	+2				

Silica has been considered to be present in colloidal form, and this is in accordance with the generally accepted view. Kahlenberg and Lincoln,[a] who are quoted by Clarke,[b] conclude from their experiments that it appears safe to say that in natural waters silica always

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[a] Kahlenberg, L., and Lincoln, A. T., Solutions of silicates of the alkalies: Jour. Phys. Chem., vol. 2, 1898, p. 77.

[b] Clarke, F. W., The data of geochemistry: Bull. U. S. Geol. Survey No. 330, 1898, p. 151.

occurs in the colloidal state, and Kohlrausch[a] and other investigators make practically the same statement. Iron and aluminum have been treated as bases in waters containing free mineral acids and as if present in colloidal state in all other waters. The omission or addition of iron in the bases makes no practical difference in the calculated error of nearly all the analyses, and aluminum was usually not estimated.

Sodium and potassium have been computed as if no potassium were present—that is, the alkalies have been computed from the weight of the combined chlorides by using the molecular weight 58. That this disregard of potassium in analyses of ordinary river waters introduces a negligible error may be demonstrated mathematically as follows. The ratio of sodium to potassium determined on 103 composite samples of river water is between 1.8 and 31.2, averaging 5.1, and the assumption that the ratio equals 2 allows practically a maximum value for potassium. If Na/K = 2, the error expressed in percentage of the calculated combining value of the alkalies is given in the following equation, in which x equals the amount of potassium in parts per million:

$$\frac{39.4\times0.0434(2.54\times2x+1.90x)-4.34\times2x-2.55x}{0.394\times0.0434(2.54\times2x+1.90x)}=5.9$$

If it is assumed that Na/K equals 5 the error is 2.8 per cent of the combining value of the alkalies. Furthermore, as high alkalies are usually accompanied by high ratios, it is doubtful whether a river with sodium and potassium as high as 15 per cent of the combining values would have a ratio as low as 5. In fact, the assumptions that the combining value of Na + K equals 18 per cent of the total combining weights and that the ratio Na/K equals 2 probably represent extreme and very unusual conditions, and even under such conditions the error introduced by using the molecular weight of sodium chloride is only 1 per cent.

On the other hand, the calculation of potassium as such when the true ratio is known increases the sum of the constituents. If x equals the ratio Na/K the ratio of the true value of Na + K to the calculated value of Na + K becomes

$$\frac{x+1}{x+0.75}.$$

In other words, the calculated value for sodium and potassium is always less than the true value, and the difference between the two is greater as x decreases. But this error also is negligible in nearly all analyses. Other elements either not included in the estimates

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[a] Kohlrausch, F., Über Lösungen von Natriumsilikaten: Zeitschr. physikal. Chemie, vol. 12, 1893, p. 773.

or disregarded in the computations, such as barium, strontium, lithium, manganese, and phosphates, are probably present in quantities so small that they have no appreciable effect on the calculations. Organic acids, which were not estimated, are an important exception to this statement, and they probably account for many of the computed excesses of bases over acids.

An important feature to be considered in discussing the probable accuracy of the analyses is the limit of accuracy of the individual determinations. The specimen analysis in Table 6 has 142 parts per million of total solids and the computed percentage of error of the combining values is zero. If, however, each radicle were in error by the amount given in Table 2 as the limit of accuracy in determination an error of 4 per cent would accrue; but as this theoretical maximum error is based on the assumption that eight figures may attain the maximum deviation in a given direction in the same analysis, the probabilities of its occurrence are small. When the error of combining values is as high as this or higher it is usually the case that one or two constituents deviate by an amount more than the theoretical limit of accuracy while the other radicles are relatively constant. The percentage of error due to this source varies inversely with the sum of the constituents; in other words, it is greater with low total solids and less with high total solids. It also changes somewhat with changes in the relative composition of the residue. It is interesting to note in this connection that the computations of 800 analyses made at one laboratory give 3.9 per cent as the average error of the combining values, with an average of total solids of 130 parts per million, figures coinciding almost exactly with the theoretical estimates.

RELATION BETWEEN TOTAL SOLIDS AND PERCENTAGE OF ERROR.

Though part of the analyses made in accordance with the regular methods are reported in this paper only by averages, it is deemed proper to discuss the errors of all in this section because of the amount of available material. The analyses, irrespective of the source from which the waters were taken and the laboratory in which the analyses were made, have been grouped according to the amount of total solids, and the percentages of error of the combining values have been averaged by groups. The results of these computations are presented in Table 7. Practically all the analyses were made with the regular amounts of water, and those in which greater or less amounts were used are so few that they do not affect the results.

TABLE 7.—*Percentage of errors of combining values grouped according to the amount of dissolved solids.*

Dissolved solids (parts per million).		Number of analyses.	Average error of combining weights (per cent).
Not less than—	Less than—		
....	50	65	6.5
50	100	844	5.3
100	200	713	4.5
200	300	907	3.1
300	400	451	2.9
400	500	137	2.8
500	1,000	134	2.6
1,000	2,000	70	1.6
		3,321	

The average error computed for the entire number of 3,321 analyses is 3.9 per cent, with an average of dissolved solids of 230 parts per million. The average errors of the several groups range from 6.5 per cent for solids below 50 parts to 1.6 per cent for solids between 1,000 and 2,000 parts per million, and the magnitude of the error decreases with increase of dissolved solids. A comparatively small number of very large errors make the averages somewhat higher than they otherwise would be, nearly two-thirds of the analyses having errors smaller than the averages of their respective groups. In 60 per cent of the analyses the bases are in excess, but this preponderance of positive errors is confined almost entirely to waters in which the dissolved solids are less than 250 parts per million and is not great enough to be especially significant. The significance of the average error of 3.9 per cent with 230 parts per million of dissolved solids can better be realized when it is considered that if it were all concentrated in a single determination it would amount to only 14 parts of bicarbonates, 5 parts of calcium, or 3 parts of magnesium. It corresponds to an average error in the individual determination of about 4 per cent, which is far within the limits of ordinary practice. In consideration of the relatively small amounts of substance that may cause these errors, it may be concluded that the procedures are sufficiently accurate for the practical analysis of waters for purposes of geologic and industrial interpretation.

As the procedures were used in several laboratories, an opportunity is afforded for observing their general availability in the hands of different chemists. The average percentage errors for several analysts were between 3.2 and 5.3 per cent. These figures are complicated by the fact that the difference in quality of the waters at various laboratories affected somewhat the accuracy of the determinations; nevertheless the highest average error coincides with the lowest average of total solids, and the lowest average error with the highest average of total solids; in other words, the errors of analysis of different chemists follow nearly the same order shown in Table 7, and depend more on the quality of the water than on the personal equation of the analyst.

RELATION BETWEEN SOURCE AND PERCENTAGE OF ERROR.

After the analyses had been tabulated by rivers, the average percentage of error of the individual analyses of water from each river was computed. Then, by applying the criteria for rejecting estimates (see p. 38), abnormal figures in the analyses were detected and omitted from the tabulations, and the remaining figures in each set were averaged in order to show the average condition of the waters, the average percentage error of the individual analyses, the percentage of error of the averages, and the average total dissolved solids of each river. The plus signs in the last column of the following table indicate that the bases are in excess, and the minus signs indicate that the acidic radicles are in excess:

TABLE 8.—*Average percentage of errors of combining weights.*

Source (river, except as noted).	Sampling station.	Average total dissolved solids (parts per million).	Average percentage of error of individual analyses.	Percentage of error of average.
Brazos	Waco, Tex	1,136	2.1	− 0.6
Wabash	Logansport, Ind	807	2.2	− 2.5
Arkansas	Little Rock, Ark	630	2.1	− 0.2
Red	Shreveport, La	561	2.1	+ 1.8
Minnesota	Shakopee, Minn	480	3.4	− 0.3
Missouri	Florence, Nebr	454	2.8	− 0.7
White	Indianapolis, Ind	450	2.1	− 0.8
Platte	Columbus, Nebr	437	2.9	+ 0.6
Missouri	Kansas City, Kans	426	3.9	− 0.4
Missouri	Ruegg, Mo	346	3.6	− 0.1
Wabash	Vincennes, Ind	336	3.3	− 0.8
Des Moines	Keosauqua, Iowa	312	3.1	+ 1.3
Platte	Fremont, Nebr	302	2.6	+ 0.5
Maumee	Toledo, Ohio	298	2.3	+ 0.8
North Platte	North Platte, Nebr	294	2.6	+ 1.9
Miami	Dayton, Ohio	289	1.5	+ 0.2
White	Azalia, Ind	279	3.4	+ 0.1
Grand	Grand Rapids, Mich	258	1.7	+ 0.4
Iowa	Iowa City, Iowa	247	3.1	+ 1.4
Muskingum	Zanesville, Ohio	244	3.9	− 0.6
Kalamazoo	Kalamazoo, Mich	242	3.6	+ 1.9
Cedar	Cedar Rapids, Iowa	228	3.2	+ 0.3
Mississippi	Memphis, Tenn	202	4.9	+ 4.6
Mississippi	Minneapolis, Minn	200	4.1	+ 1.0
Youghiogheny	McKeesport, Pa	197	4.5	+ 1.6
Mississippi	New Orleans, La	166	....	+ 4.0
Shenandoah	Millville, W. Va	140	3.2	+ 2.1
St. Lawrence	Ogdensburg, N. Y	[a] 134	1.1	− 1.2
Lake Erie	Buffalo, N. Y	[a] 133	1.4	− 0.8
Potomac	Cumberland, Md	130	4.2	− 0.5
Cumberland	Kuttawa, Ky	124	4.5	+ 2.7
Tennessee	Knoxville, Tenn	122	4.7	− 0.3
Cumberland	Nashville, Tenn	119	5.0	+ 3.6
Lake Michigan	St. Ignace, Mich	[a] 118	0.9	+ 0.2
Susquehanna	Danville, Pa	112	3.9	+ 0.3
Hudson	Hudson, N. Y	108	3.0	+ 1.4
Lake Huron	Port Huron, Mich	[a] 108	1.7	+ 1.5
Kentucky	Frankfort, Ky	104	4.5	+ 3.0
Tennessee	Gilbertsville, Ky	101	6.4	+ 3.5

[a] Double portions of water used for analysis.

TABLE 8.—*Average percentage of errors of combining weights*—Continued.

Source (river, except as noted).	Sampling station.	Average total dissolved solids (parts per million).	Average percentage of error of individual analyses.	Percentage of error of average.
Wisconsin	Portage, Wis	98	9.8	+ 8.1
Lehigh	South Bethlehem, Pa	95	3.6	+ 1.0
Tombigbee	Epes, Ala	94	5.3	+ 5.7
Chippewa	Eau Claire, Wis	90	11.8	+10.0
Susquehanna	West Pittston, Pa	90	4.3	− 0.3
James	Richmond, Va	89	3.7	+ 0.4
Allegheny	Kittanning, Pa	87	2.5	+ 2.1
Raritan	Bound Brook, N. J	85	4.0	+ 2.0
Alabama	Selma, Ala	82	7.3	+ 6.3
Oostanaula	Rome, Ga	82	4.5	+ 9.0
Monongahela	Elizabeth, Pa	81	4.5	− 0.4
Roanoke	Randolph, Va	79	3.5	− 0.4
Oswegatchie	Ogdensburg, N. Y	77	7.2	+ 4.9
Cahaba	Birmingham, Ala	76	6.2	+ 6.0
Susquehanna	Williamsport, Pa	74	5.7	+ 0.9
Wateree	Camden, S. C	73	4.8	+ 5.1
Neuse	Raleigh, N. C	73	4.7	+ 1.0
Dan	South Boston, Va	71	4.0	− 1.4
Delaware	Lambertville, N. J	70	5.5	+ 0.4
Ocmulgee	Macon, Ga	69	5.0	+ 8.5
Pedee	Pee Dee, N. C	69	3.4	+ 9.1
Oconee	Dublin, Ga	68	5.0	+ 3.9
Flint	Albany, Ga	67	6.9	....
Saluda	Columbia, S. C	62	5.1	....
Savannah	Augusta, Ga	60	6.6	+11.7
Lake Superior	Sault Ste. Marie, Mich	[a] 60	2.0	+ 1.5
Pearl	Jackson, Miss	59	3.6	+ 4.4
Cape Fear	Wilmington, Del	57	4.4	+ 3.0
Chattahoochee	West Point, Ga	52	5.8	+ 8.5
Androscoggin	Brunswick, Me	48	....	....

[a] Double portions of water used for analysis.

The average percentage of error of the combining values in the individual analyses increases inversely with the total solids, with few exceptions, as might be anticipated from the results in Table 7. The percentages of error of the averages do not bear any fixed relation to the percentages of error of the individual analyses, except that the former are usually smaller. This decrease is due partly to the elimination of abnormal estimates before computing the averages, but calculation of averages without omitting any figures has proved that only a small part of the decrease is due to that factor, and it is reasonable to conclude, therefore, that a portion of the error is variable. A considerable part of the difference between the error of the average and the error of the individual analyses is caused apparently by variable manipulative errors that tend to neutralize each other in the average. A few of the rivers, notably the Oswegatchie at Ogdensburg, N. Y., the Delaware at Lambertville, N. J., the Chippewa at Eau Claire, Wis., and the Wisconsin at Portage, Wis., have high percentages of error of the individual analyses, and all except Delaware River have high positive errors in the averages. The errors of nearly all the analyses of water from these four rivers are positive; that is, the bases are higher than the acids. It is significant that all these rivers are high in organic matter of vegetable origin, and possibly organic acids are present in equilibrium with a portion of the bases.

RELATION BETWEEN AMOUNT OF WATER AND PERCENTAGE OF ERROR.

Regular amounts of water for the individual determinations were used in most of the analyses that have been discussed. Double the regular amounts were, however, used in the analyses of 60 waters from the Great Lakes and from St. Lawrence River, and half the regular amounts were used for 600 waters, the errors of which are not included in Tables 6 and 7. The average percentage of error of combining values of the lake waters is 1.4 per cent, and the average of dissolved solids is 111 parts per million. The same figures for analyses made with the usual amounts of water are 3.7 and 230, respectively, and the corresponding averages for analyses made with half the regular amounts of water are 5.3 and 650. Though the lakes contain very clear carbonated waters with little organic matter in them and the waters in the last set are high in fine, gummy suspended matter which complicates the analysis, yet the figures just given indicate a relation between the amount of water that is used and the percentage of error of the analysis, thus giving additional evidence in favor of the conclusion that the errors have a large variable proportion. General experience in the laboratory has shown that it is better to use double portions of water when dissolved solids are less than 70 parts per million and to run duplicate determinations with smaller amounts of water when dissolved solids exceed 600 parts per million.

REJECTION OF ANALYSES.

Table 9 shows the bases on which analyses or parts of analyses were rejected. The limits have been fixed in accordance with theoretical computations and experience gained in practical work.

TABLE 9.—*Criteria for rejecting analytical data.*

Parts per million.				Per cent.
Dissolved solids.		Maximum excess of total dissolved solids over sum of constituents.	Maximum excess of sum of constituents over total dissolved solids.	Maximum error of combining values.
Not less than—	Less than—			
....	50	15	5	15
50	100	20	6	7
100	200	30	8	5
200	500	40	12	4
500	1,000	50	....	3
1,000	2,000	....	....	2

Analyses exceeding these limits should be subjected to careful scrutiny, and doubtful estimates should be either repeated or rejected. Due allowance should be made for organic matter that may be present, and an excess of the sum of the constituents over dissolved solids should be more carefully scrutinized than the opposite condition.

METHOD OF EXPRESSING ANALYTICAL RESULTS.

STATEMENT IN PARTS PER MILLION.

The results of the analyses in this paper are stated in parts per million, and though the amounts of water for examination were measured by volume the mineralization is usually so low that the figures may be considered to represent parts per million by weight. Simplicity of computations, avoidance of fractions, and certainty of the basic unit make this decimal system especially satisfactory for practical purposes. Expression of the results of water analyses in parts per million has been generally adopted by sanitary and research chemists and by many technical chemists, and the exclusive employment of this unit industrially is delayed only by more or less objectionable precedent.

For the convenience of those who may desire to transfer the results in this volume to other forms of expression it may be stated that an amount in parts per million multiplied by 0.058 gives the equivalent in grains per United States gallon of 231 cubic inches; multiplied by 0.07 gives the equivalent in grains per imperial gallon, and multiplied by 0.00833 gives the equivalent in pounds per thousand gallons.

STATEMENT IN IONIC FORM.

The analytical methods commonly applied to the examination of water permit the estimation of the elements and radicles that are present. They also enable the determination of the total amount of mineral matter in solution, and by the treatment with dilute alcohol employed by Dudley,[a] the Kennicott Water Softener Company,[b] and others they allow more or less approximate separation of the incrusting from the nonincrusting constituents. But, further than this, ordinary chemical tests contribute little to knowledge regarding the chemical composition of mineral waters, and consequently the exact amounts of the different salts in solution are largely matters of conjecture. In an ordinary mineral water, for instance, it is customary to determine by analysis the amounts of the several ingredients—silica, iron, aluminum, calcium, magnesium, sodium,

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[a] Personal communication from Dr C. B. Dudley, chief chemist, Pennsylvania Lines.

[b] Method of water analysis, published by the Kennicott Water Softener Company, Chicago Heights, Ill.

potassium, the carbonate, bicarbonate, sulphate, and nitrate radicles, chlorine, and other bases and acids that it may be desirable to estimate; but the salts like sodium chloride, potassium carbonate, or magnesium sulphate are not determined as such, and though salts are probably present in solution the analytical data are insufficient to permit the apportionment of the bases among the acids.

According to the dissociation theory advanced by Arrhenius and supported by the exhaustive researches of physical chemistry, a salt in solution becomes more or less thoroughly ionized, and its ingredients exist not only in molecular condition but also in the ionic state, the extent of dissociation being dependent on the nature of the salt and on other factors. All the bases present are in equilibrium, more or less, with all the acids, but with information only as to the amount of the elements and radicles that are in a natural water it becomes mathematically impossible to calculate the correct amounts of the different salts in solution. Yet many water analysts have been accustomed to make such combinations in accordance with rules that may appear reasonable or advisable at the time. As such rules are necessarily arbitrary in their nature, however, reports by different analysts are frequently so widely divergent in form as to be incapable of comparison with each other. As Clarke[a] has so aptly stated it, "The result is a meaningless chaos of assumptions and uncertainties." Reference to directions given by various authors[b] shows the divergence of practice in uniting the bases and acids when combinations are computed, and it suggests the complications that occur in practice. Handy[c] has called particular attention to the confusion in methods of computation, and McGill,[d] Kimberley,[e] and others also mention it.

There is at present a well-defined desire among chemists to break away from the misleading conventions imposed by statement in combinations by presenting and discussing analytical data in a form that avoids as far as possible the personal equation of the analyst. Haywood and Smith[f] have proposed for classifying on the ionic basis mineral waters in respect to their therapeutic action a scheme that will undoubtedly be entirely practicable with some additions and modifications suggested by its extended use. A system of

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[a] Clarke, F. W., The data of geochemistry: Bull. U. S. Geol. Survey No. 330, 1908, p. 54.

[b] Walter, G., and Gärtner, A., Tiemann-Gärtner's Handbuch der Wasser, Braunschweig, 4th ed., 1895, p. 357. Fresenius, C. R., Quantitative chemical analysis, 2d American ed., 1897, p. 674. Stillman, T. B., Engineering chemistry, 1897, p. 65. Wanklyn, J. A., Water analysis, 9th ed., 1894, p. 110.

[c] Handy, J. O., Water softening: Eng. News, vol. 51, 1904, p. 500; also Proc. Eng. Soc. Western Pennsylvania, vol. 19, 1903, p. 659.

[d] McGill, Anthony, Boiler feed waters: Bull. Am. Ry. Eng. and Maintenance of Way Assoc. No. 6, 1905, p. 612.

[e] Kimberley, A. E., The chemical phases of a water-softening problem: Jour. Infect. Dis., Suppl. No. 1, May, 1905, p. 157.

[f] Haywood, J. K., and Smith, B. H., Mineral waters of the United States: Bull. Bur. Chem., U. S. Dept. Agr., No. 91, 1905, p. 9.

formulas evolved by Stabler[a] and based on the ionic form reduces the classification of waters for steaming and for general industrial use to mathematical certainty and makes it apparent that the fundamental data obtained by actual analysis are sufficient for determining the value of a natural water and for estimating the cost of purifying it in general industrial operations. Further evidence of the desire to effect a reform in the methods of reporting water analyses is furnished by the resolutions adopted by scientific associations. As early as 1886 a committee[b] appointed by the Chemical Society of Washington recommended that all analyses of water should be stated in terms of the radicles found, whether elementary or compound, meaning thereby the immediate results of the actual analysis; and though the committee recommended that the combinations deemed most probable by the chemist making the analysis should also be stated, they were careful to avoid any recommendation as to the manner of combining the analytical results, because the views of chemists would probably differ so much in that respect. The report of this committee was adopted by section C of the American Association for the Advancement of Science in 1887,[c] but two years later a committee of the British Association for the Advancement of Science,[d] while agreeing with the American Association in reporting the analytical data obtained by direct determination, disapproved the statement of the mineral ingredients combined as salts. Since that time many other scientific organizations in America and in Europe have recommended the statement of the actual results instead of the combinations deduced by the chemist. At the Fifth International Congress of Applied Chemistry[e] in 1903, the discussion of two papers on methods of expressing the results of a water analysis indicated that many of the chemists favored the ionic form of statement, and at the Sixth International Congress Christomanos[f] recommended that the simple statement of the acidic and basic ions in parts per million be made in all water analyses.

The ionic form of statement appeals particularly to the analytical chemist because it affords an opportunity of stating results that can be checked for their accuracy by persons other than those making the tests. When hypothetical combinations are made, one of three methods of procedure is usually followed—(1) all the bases and acids except the alkalies present in appreciable amount are estimated, and the excess of acids is computed to an equivalent of sodium and

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[a] Stabler, Herman, The mineral analysis of water for industrial purposes and its interpretation by the engineer: Eng. News, vol. 60, 1908, p. 355.

[b] Bull. Chem. Soc. Washington No. 2, 1887, p. 35.

[c] Chem. News, vol. 56, 1887, p. 113.

[d] Chem. News, vol. 60, 1889, p. 203.

[e] Bericht V. Internationaler Kongress für angewandte Chemie, vol. 1, 1903, p. 261.

[f] Christomanos, A. C., Bericht über die Arbeiten der VI. Unter-Kommission der Internationalen Analysen-Kommission: Atti del VI. Congresso Internazionale di Chimica Applicata, vol. 7, 1907, p. 213.

potassium salts; or (2) all the bases and acids except the carbonates are estimated, and the excess of bases computed to an equivalent in carbonates; (3) if all the bases and acids are determined, it is necessary to "doctor" the figures of the hypothetical combinations in order properly to balance the bases and the acids. These methods of procedure effectively conceal errors of technique and leave it entirely to the judgment of the analyst whether his error of closure is too great or too little, and the evidence on which his judgment is based is completely masked because the hypothetical combinations show no error at all. On the other hand, the ionic form of statement, because it gives the determined elements and radicles, makes it possible to balance the acids against the bases and to determine the probable accuracy of the work.

In brief, it may be said that the ionic form of presenting the results of an analysis of a mineral water gives a statement of facts and not of opinion. The form is entirely practical and presents the actual results for the consideration and criticism of persons other than those making the tests. As it is in accordance with the generally accepted views based on our knowledge of chemistry, the analyses in this volume have been stated in that way.

LOCATION OF SAMPLING STATIONS.

The location of the sampling stations, the names of the collectors, and information regarding immediate surroundings likely to influence the quality of the water are given in the table which follows, and the list is arranged alphabetically by names of the rivers and lakes. If stream-gaging data are available the location of the gaging station is stated, together with its distance above (+) or below (−) the sampling station. Several factors were necessarily considered in determining the location of the points at which samples of water were to be collected. The relative importance of the streams from a geologist's standpoint, particularly in regard to denudation, was given much weight; and practical considerations in relation to the industrial uses of the waters, the procurement of collectors, the shipment of samples, and other more or less local features influenced the selection.

List of sampling stations.

Source of sample (river, except as noted) and location of sampling station.	Gaging station.		Name of collector.	Remarks regarding collection of samples.
	Location, showing distance, in miles, above (+) or below (−) sampling station	[a] Maintained by—		
Alabama, Selma, Ala	Same	G. S.; W. B	C. F. Brislin	Midstream from iron highway.
Allegheny, Kittanning, Pa	do	G. S	S. B. Cochrane	Midstream from Market Street Bridge.
Androscoggin, Brunswick, Me	None		F. C. Robinson	Above dam.
Arkansas, Little Rock, Ark	Same	W. B.; E. C	W. J. Riley	From waterworks intake.
Big Muddy, Murphysboro, Ill	do	Ill	H. C. Stagner	Do.
Big Vermilion, Danville, Ill	None		W. Van Stienberg	Do.
Brazos, Waco, Tex	Same	G. S.; W. B	W. J. Cassaday	Midstream from suspension bridge.
Cache, Mounds, Ill	do	Ill	J. F. Anderson	From intake of I. C. R. R.
Cahaba, Birmingham, Ala	Centerville, −60	G. S	D. J. O'Connell	From waterworks intake.
Cape Fear, Wilmington, N. C	Fayetteville, +75	W. B	Oscar Durant	Midstream from ferryboat.
Cedar, Cedar Rapids, Iowa	Same	G. S.; W. B	R. S. Toogood	Midstream from bridge.
Chattahoochee, West Point, Ga	do	G. S.; W. B	E. N. Dunn	Midstream from Montgomery Street Bridge.
Chippewa, Eau Claire, Wis	do	G. S	J. C. Kimpton	Midstream from highway bridge.
Colorado, Austin, Tex	Mauch Chunk	G. S.; W. B		
Cumberland:				
Nashville, Tenn	Fayetteville	W. B.; E. C	J. T. Ahearn	
Kuttawa, Ky	Clarkesville, Tenn.; +70.	W. B	W. E. Mathews	
Dan, South Boston, Va	Same	G. S	J. R. East	Midstream from railway bridge.
Delaware, Lambertville, N. J	do	G. S	C. H. Naylor	From toll bridge.
Des Moines, Keosauqua, Iowa	None		Oscar McCreary	Midstream from highway bridge.
Embarrass:				
Charleston, Ill	do		James Winkleblack Louis Strodbeck	From waterworks intake.
Lawrenceville, Ill	do		Perry Barnhouse	From intake of C., C., C. and St. L. Ry.
Erie (Lake), Buffalo, N. Y	Same	E. C	H. L. Lyon	From waterworks intake.
Flint, Albany, Ga	do	G. S.; W. B	D. W. Brosran	Midstream from county bridge.
Fox:				
Elgin, Ill	None		R. R. Parkins	From waterworks intake.
Ottawa, Ill	do		M. P. Lannigan	From intake of C., R. I. and P. Ry.
Grand, Grand Rapids, Mich	Same	G. S	L. W. Anderson	Midstream from Fulton Street Bridge.
Hudson, Hudson, N. Y	None		E. Van Benschoten	
Huron (Lake), Port Huron, Mich	Harbor Beach, +60	E. C	J. E. Meno	Midstream, St. Clair River.
Illinois:				
La Salle, Ill	Same	G. S.; W. B	James Brotherton	From intake of I. C. R. R.
Peoria, Ill	do	G. S.; W. B	Alfred Barton	Midstream from bridge.
Kampsville, Ill	do	Ill	Ira Davidson	Midstream.
Iowa, Iowa City, Iowa	None		A. G. Smith	Do.

[a] G. S.=U. S. Geological Survey; W. B.=U. S. Weather Bureau; E. C.=Engineer Corps, U. S. Army; Ill.=Engineering Experiment Station, University of Illinois.

List of sampling stations—Continued.

Source of sample (river, except as noted) and location of sampling station.	Gaging station.		Name of collector.	Remarks regarding collection of samples.
	Location, showing distance, in miles, above (+) or below (−) sampling station.	[a] Maintained by—		
James, Richmond, Va.	Same.	W. B.	Beverley Richardson.	Above city.
Kalamazoo, Kalamazoo, Mich.	Allegan, −30.	G. S.	Morris Christlieb.	Midstream.
Kankakee, Kankakee, Ill.	None.		A. L. Straley.	From waterworks intake.
Kaskaskia:				
Carlyle, Ill.	Same.	Ill.	George Schilling.	Do.
Shelbyville, Ill.	do.	Ill.	Isaac Nutt.	Midstream from old dam.
Kentucky, Frankfort, Ky.	do.	W. B.	D. L. Holland.	Midstream.
Lehigh, South Bethlehem, Pa.	Mauch Chunk, +30.	W. B.	H. M. Ueberroth.	From waterworks intake.
Little Vermilion, Streator, Ill.	None.		R. D. Huggans.	In current.
Little Wabash, Carmi, Ill.	Newhaven, −20.	Ill.	Samuel Morgan.	Do.
Maumee, Toledo, Ohio.	None.		J. M. Wisler.	From waterworks intake.
Miami, Dayton, Ohio.	Same.	W. B.	B. F. Glass.	
Michigan (Lake), St. Ignace, Mich.	Mackinaw, 5.	E. C.	Albert Boynton.	Midchannel from ferryboat.
Minnesota, Shakopee, Minn.	Mankato, +60.	W. B.	R. C. Strunk.	Midstream from highway bridge.
Mississippi:				
Minneapolis, Minn.	Anoka, +20.	G. S.	J. H. McConnell.	From upper waterworks intake.
Moline, Ill.	Same.	Ill.	Magnus Olsen.	From waterworks intake.
Quincy, Ill.	Hannibal, Mo.; −15.	W. B.	F. J. Brinkoetter.	Do.
Chester, Ill.	Same.	W. B.		From intake of state penitentiary.
Memphis, Tenn.	do.	W. B.; E. C.	T. D. Shroyer.	
New Orleans, La.	Carrolton, +5.	E. C.	J. L. Porter.	Near new filtration plant.
Missouri:				
Florence, Nebr.	Omaha, −5.	W. B.	J. B. Denton.	
Kansas City, Kans.	Same, −7[b].	W. B.	H. A. Sickels.	From Quindaro intake.
Ruegg, Mo.	Hermann, +70.	W. B.	William Bausch.	Midstream from railroad bridge.
Monongahela, Elizabeth, Pa.	Lock No. 4, +10.	W. B.	F. E. Hatch.	Midstream.
Muskingum, Zanesville, Ohio.	Same.	G. S.; W. B.	C. J. Crossland.	Midstream from bridge.
Neuse, Raleigh, N. C.	None.		A. H. Byrum.	Near Milburnie.
North Platte, North Platte, Nebr.	Same.	G. S.	Henry Deck.	Main channel from highway bridge.
Oconee, Dublin, Ga.	do.	G. S.; W. B.	W. E. Martin.	Midstream from highway bridge.
Ocmulgee, Macon, Ga.	do.	G. S.; W. B.	G. E. Lawton.	Midstream from bridge.
Oostanaula, Rome, Ga.	do.	W. B.	W. M. Chambers.	At waterworks pumping station.
Oswegatchie, Ogdensburg, N. Y.	do.	G. S.	H. A. Lord.	From waterworks intake.
Pearl, Jackson, Miss.	do.	G. S.; W. B.	James Hurst.	Midstream from highway bridge.
Pedee, Pedee, N. C.	Cheraw, S. C., −20.	W. B.	Richardson.	Midstream.
Platte:				
Columbus, Nebr.	Same.	G. S.	W. D. Benson. F. L. Hahn.	Midstream from Meridian Bridge.
Fremont, Nebr.	None.		C. H. Daniels.	Midstream.

Potomac, Cumberland, Md	Same	W. B	Joseph L. Sell	In current.
Raritan, Bound Brook, N. J	do	G. S	J. K. Tantum	Midstream from highway bridge.
Red, Shreveport, La	do	W. B.; E. C	D. P. Irvine	Midstream from toll bridge.
Reservoir:				
Cartter, Ill	None		A. A. Justice	
Cypress, Ill	do		Garlan Adams	
Joppa, Ill	do		John Wood	
Marion, Ill	do		R. E. Coler	
Rio Grande, Laredo, Tex	Same	(c)		
Roanoke, Randolph, Va	do	G. S	J. E. Figg	Midstream from railroad bridge.
Rock:				
Rockford, Ill	Rockton, +15	G. S	F. H. Gregory	From waterworks intake.
Sterling, Ill	None		C. A. Yohn	From intake of Illinois Straw Product Co.
St. Lawrence, Ogdensburg, N. Y	Same	E. C	H. A. Lord	In midstream.
Saluda, Columbia, S. C	Chappells, +50	W. B	E. N. Chisholm, jr	In current.
Sangamon:				
Decatur, Ill	Same	Ill	Fred Litterer	From waterworks intake.
Springfield, Ill	None		Gus Obert	Do.
Chandlerville, Ill	Same	Ill	J. W. Martin John Madden	Midstream from highway bridge.
Savannah, Augusta, Ga	do	G. S.; W. B	C. A. Maxwell	Do.
Shenandoah, Millville, W. Va	do	G. S	W. R. Nicewarner	From bank of stream.
Superior (Lake), Sault Ste. Marie, Mich	Marquette, +160	E. C	Lester Hodges Alice Hodges	From railroad bridge above locks.
Susquehanna:				
West Pittston, Pa	Wilkes-Barre, +10	G. S.; W. B	J. A. Allan	(d)
Williamsport, Pa	Same	G. S.; W. B	H. H. Guise	Midstream from bridge.
Danville, Pa	do	G. S	E. F. Bell	Do.
Tennessee:				
Knoxville, Tenn	do	G. S.; W. B	Knoxville Water Co	In main current.
Gilbertsville, Ky	Johnsonville, Tenn.; +80.	W. B	Earle Herndon	Midstream from railroad trestle.
Tombigbee, Epes, Ala	Same	G. S	J. C. Horton	Midstream from railway bridge.
Wabash:				
Logansport, Ind	None		John Bender	Midstream above Eel River.
Vincennes, Ind	Mount Carmel, Ill.; −30.	W. B	L. J. Weisenberger	From waterworks intake.
Wateree, Camden, S. C	Same	G. S.; W. B	W. C. Brown	Midstream from bridge.
White:				
Azalia, Ind	None		L. E. Davis	
Indianapolis, Ind	do		H. E. Jordan	In main current.
Wisconsin, Portage, Wis	Necedah, −50	G. S	Charles McSorley	Midstream from steel bridge.
Youghiogheny, McKeesport, Pa	West Newton, +10	W. B	National Galvanized Works.	Midstream.

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[a] G. S.=U. S. Geological Survey; W. B.=U. S. Weather Bureau; E. C.=Engineer Corps, U. S. Army; Ill.=Engineering Experiment Station, University of Illinois.

[b] The sampling station is above the entrance of Kansas River, but the gaging station is below that stream.

[c] Observations made under direction of the Mexican section of the International (Water) Boundary Commission.

[d] Samples collected by Spring Brook Water Supply Company from their intake at West Pittston till December, 1906, after which samples were collected near Forest Castle Brewery, Pittston.

ANALYTICAL RESULTS.

The following tables give the results of the analyses of certain rivers and lakes east of the one hundredth meridian. Each table presents a detailed statement of the results of the analyses of composite samples, arranged in chronological order, followed by lines showing the mean of the analyses and the chemical composition of the anhydrous residue. Wherever gage heights were available they were averaged in sets corresponding to the sampling periods, and this computed average is included in the table.

At the end of the detailed analyses is a table in which the lines showing average quality of the waters analyzed both in parts per million of mineral matter and in percentage composition of the anhydrous residues are assembled. The list of localities in this last table includes 27 in the State of Illinois not included in the preceding detailed statements.

Mineral analyses of water from Alabama River at Selma, Ala.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO$_2$).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO$_3$).	Bicarbonate radicle (HCO$_3$).	Sulphate radicle (SO$_4$).	Nitrate radicle (NO$_3$).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Nov. 5	Nov. 17	65	22	0.34	.....	19	0.7	12	1.6	.....	0.0	46	......	0.3	0.2	79	3.8
Nov. 18	Nov. 27	180	97	.54	.....	40	.6	12	.8	.....	.0	41	......	.5	2.0	91	17.1
Nov. 28	Dec. 7	155	118	.76	.....	34	.8	11	1.2	.....	.0	39	......	.6	1.8	82	11.0
Dec. 8	Dec. 17	180	145	.80	.....	31	.5	9.6	1.6	.....	.0	32	......	.3	2.0	78	7.0
Dec. 18	Jan. 1	80	49	.61	.....	20	.5	11	Tr.	.....	.0	31	......	.4	.....	78	10.7
Jan. 2	Jan. 13	50	42	.84	.....	21	.20	8.3	4.4	.....	.0	44	......	.3	3.5	83	19.5
Jan. 14	Jan. 23	35	21	.60	.....	20	.40	16	2.8	.....	.0	44	......	.8	3.2	73	7.7
Jan. 24	Feb. 2	65	45	.69	.....	26	.30	8.4	1.6	.....	.0	37	......	.1	4.5	67	7.5
Feb. 3	Feb. 12	100	62	.62	.....	26	.5	8.2	2.4	.....	.0	32	......	.8	2.8	66	27.9
Feb. 13	Feb. 24	25	19	.76	.....	10	.5	14	1.2	.....	.0	44	......	.4	3.0	58	9.4
Feb. 25	Mar. 6	260	195	.75	.....	22	.10	15	2.0	.....	.0	46	......	.3	1.0	79	23.0
Mar. 7	Mar. 16	160	124	.78	.....	28	.10	10	1.2	.....	.0	34	......	.5	3.0	70	20.8
Mar. 17	Mar. 26	95	86	.91	.....	20	.20	15	1.2	.....	.0	49	......	.3	1.5	70	9.3
Mar. 27	Apr. 5	40	41	1.02	.....	20	.20	16	1.6	.....	.0	51	......	.4	2.5	72	6.3
Apr. 6	Apr. 15	95	89	.93	.....	22	.40	15	5.2	.....	.0	58	......	.1	1.5	80	7.4
Apr. 16	Apr. 25	195	176	.90	.....	22	.5	12	5.2	.....	.0	51	......	.2	3.0	76	13.3
Apr. 26	May 5	220	184	.84	.....	30	.40	10	3.6	.....	.0	41	......	.1	2.0	74	16.1
May 6	May 15	90	70	.78	.....	19	.40	12	2.8	.....	.0	....	......	.1	2.5	63	16.5
May 16	May 25	312	228	.73	.....	13	1.2	13	2.3	3.2	.0	43	10	1.3	1.2	94	23.9
May 26	June 3	165	117	.71	.....	15	1.0	11	2.6	.....	.0	48	13	.4	1.8	90	12.7
June 6	June 15	195	157	.80	.....	25	1.3	13	2.8	5.6	.0	46	9.4	1.6	1.7	98	9.9
June 16	June 25	90	101	1.12	.....	17	.5	15	4.8	6.7	.0	....	14	1.2	2.4	90	6.0
June 26	July 6	205	139	.68	.....	11	.35	18	2.3	6.7	.0	61	8.7	.9	2.1	86	7.2
July 7	July 16	210	126	.60	.....	22	1.1	15	4.5	5.5	.0	55	......	1.6	2.1	104	4.0
July 17	July 26	125	86	.69	.....	16	.48	17	5.8	.....	.0	67	10	1.6	3.0	105	4.4
July 28	Aug. 6	325	203	.62	.....	17	1.1	15	5.3	8.9	[b]Tr.	50	13	1.2	1.8	99	5.4
Aug. 7	Aug. 17	230	141	.61	.....	25	1.0	15	.....	9.5	.0	....	12	1.6	2.7	101	3.8
Aug. 18	Aug. 27	160	58	.36	.....	23	1.2	13	.....	7.8	.0	60	9.4	1.1	2.0	110	2.7
Aug. 28	Sept. 6	100	59	.59	.....	21	1.0	16	4.8	5.7	.0	59	8.7	.4	2.5	105	1.4
Sept. 8	Sept. 17	80	65	.81	2.2	21	Tr.	15	4.0	8.1	.0	68	4.8	1.0	2.2	88	2.1
Sept. 18	Sept. 27	90	70	.78	2.2	17	.03	14	4.1	7.4	.0	66	5.0	1.0	2.4	82	2.0
Sept. 28	Oct. 7	180	105	.58	2.8	11	Tr.	12	3.0	6.7	.0	56	3.7	1.1	2.4	64	4.7
Oct. 8	Oct. 17	90	50	.56	1.	12	.03	12	2.9	9.0	.0	57	4.4	.9	2.3	68	1.5
Mean............		141	100	.72	.....	21	.53	13	2.9	7.0	.0	48	9.0	.7	2.3	82	.....
Per ct. of anhydrous residue..		....	....	......	.....	26.2	[c].9	16.2	3.6	8.7	29.4	....	11.2	.9	2.9	....	.....

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[a] Analyses November 5, 1906, to May 15, 1907, by J. R. Evans; May 16 to September 6, 1907, by Walton Van Winkle; September 8 to October 17, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Allegheny River at Kittanning, Pa.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Sept. 13	Sept. 23	19	26	1.37	0.2	12	Tr.	21	4.2	19	0.0	51	35	0.0	28	140	2.49
Sept. 24	Oct. 3	15	21	1.40	1.2	8.6	0.06	22	4.0	19	.0	61	25	Tr.	29	142	2.86
Oct. 4	Oct. 14	46	69	1.50	3.5	6.0	Tr.	18	2.0	12	.0	40	19	.6	20	107	5.68
Oct. 15	Oct. 24	21	28	1.33	1.2	11	Tr.	14	1.8	11	.0	34	13	.4	13	87	5.51
Oct. 25	Nov 3	29	63	1.24	1.5	9.2	.1	12	2.2	9.6	.0	37	12	.6	12	81	5.94
Nov. 4	Nov. 14	5	5.2	1.04	.2	7.8	.1	12	1.8	7.6	.0	36	14	.7	13	77	5.11
Nov. 15	Nov. 25	29	45	1.55	2.0	4.4	.2	12	2.2	9.3	.0	37	14	.9	12	74	7.67
Nov. 27	Dec. 5	8	5.2	.65	.2	6.0	.1	12	2.0	9.1	.0	33	14	.9	11	71	5.49
Dec. 6	Dec. 16	65	86	1.32	2.6	4.8	.15	10	3.0	4.4	.0	26	12	1.5	8.2	59	10.30
Dec. 17	Dec. 26	13	13	1.00	.9	7.6	.17	10	3.2	5.0	.0	26	13	1.1	8.4	63	7.79
Dec. 27	Jan. 5	36	40	1.11	1.6	6.2	.22	11	3.6	7.1	.0	28	16	1.7	11	73	8.15
Jan. 7	Jan. 15	38	41	1.08	1.4	5.4	.21	8.5	2.0	5.7	.0	21	12	1.0	6.7	54	11.20
Jan. 16	Jan. 25	35	48	1.37	1.8	5.4	.21	9.2	2.2	5.2	.0	19	14	1.1	7.4	55	10.20
Jan. 26	Feb. 5	6	4.2	.70	.5	7.4	.2	13	3.8	9.1	.0	32	23	1.1	10	80	5.63
Feb. 6	Feb. 16	4	2.6	.65	.4	6.8	.16	15	3.4	9.0	.0	41	23	1.2	13	89	4.60
Feb. 18	Feb. 27	6	6.0	1.00	.2	2.4	.09	16	3.4	9.8	[b]9.4	22	22	.6	16	85	4.89
Feb. 28	Mar. 10	5	2.0	.40	.4	6.8	.13	14	3.2	9.3	.0	34	20	1.1	13	83	5.27
Mar. 11	Mar. 20	....	179	......	6.5	7.0	.3	9.2	2.2	8.0	.0	28	16	1.5	8.2	65	11.46
Mar. 21	Mar. 31	27	53	1.96	1.5	3.8	.10	7.4	1.6	5.4	.0	24	12	.6	6.0	47	11.47
Apr. 1	Apr. 10	8	7.6	.95	.7	7.0	.13	10	2.6	7.2	.0	29	14	1.3	9.4	67	7.11
Apr. 11	Apr. 20	5	5.4	1.08	.4	6.4	.10	12	2.8	9.4	.0	27	16	1.0	12	73	5.77
Apr. 21	Apr. 30	40	30	.75	1.1	12	.16	9.6	2.4	9.1	.0	27	14	1.0	10	72	8.16
May 1	May 11	19	22	1.16	.9	11	.10	8.6	2.2	9.1	.0	29	12	1.0	7.6	66	8.06
May 11	May 20	19	17	.89	.6	17	.18	10	2.0	8.8	.0	37	12	.7	11	81	6.48
May 21	May 30	29	30	1.04	1.0	5.4	.10	10	1.6	8.0	.0	30	12	.6	11	64	6.99
May 31	June 9	36	29	.80	1.3	14	.15	10	1.9	8.8	.0	43	10	.5	9.1	78	7.82
June 10	June 20	20	22	1.10	.8	7.2	.10	10	2.0	8.5	.0	35	14	.3	9.7	71	6.28
June 26	June 30	18	24	1.33	1.0	7.6	.11	14	2.0	13	.0	45	14	.4	13	88	4.92
July 1	July 10	28	36	1.28	1.2	12	.15	14	2.8	11	.0	44	14	.7	13	89	5.25
July 12	July 22	15	23	1.53	1.0	10	.14	15	3.4	12	.0	45	18	.6	14	94	4.21
July 23	Aug. 1	26	30	1.15	1.1	9.0	.14	17	4.0	14	.0	50	22	.3	17	109	3.27
Aug. 2	Aug. 11	15	19	1.27	.6	10	.12	18	4.4	15	.0	51	22	.3	17	111	2.98
Aug. 12	Aug. 21	5	7.6	1.52	.3	5.4	.10	23	5.4	19	.0	63	26	.2	25	132	1.92
Aug. 22	Aug. 31	2	2.4	1.20	.2	6.4	.13	26	6.0	21	.0	71	30	.1	32	154	1.75
Sept. 1	Sept. 10	19	24	1.26	1.1	8.0	.19	25	6.0	22	.0	67	32	.2	32	155	1.99
Mean		21	30	1.14	1.2	7.9	.13	14	3.0	11	.0	38	17	.7	14	87	.....
Per ct. of anhydrous residue		....	.....	......	.....	9.1	[c].2	16.1	3.5	12.7	21.9	....	19.6	.8	16.1	....	.....

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[a] Analyses September 13 to December 5, 1906, by R. B. Dole; December 6, 1906, to March 31, 1907, by R. B. Dole and M. G. Roberts; March 4 to September 10, 1907, by Chase Palmer and M. G. Roberts.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Androscoggin River at Brunswick, Me.[a]

[Parts per million, unless otherwise stated.]

Date (1905-6).	Silica (SiO_2).	Fe_2O_3+ Al_2O_3.	Calcium (Ca).	Magnesium (Mg).	Sodium (Na).	Potassium (K).	Carbonate radicle (CO_3).	Sulphate radic'e (SO_4).	Chlorine (Cl).	Total dissolved solids.
Apr. 25	6.6	2.1	3.6	1.4	1.7	0.7	....	6.4	3.0	27
May 2	6.0	1.8	4.6	.8	2.0	.9	....	9.2	3.3	30
May 9	5.5	1.0	3.7	.6	2.0	.7	....	9.5	1.0	25
May 16	5.4	1.4	4.3	1.3	1.9	.6	....	8.2	.6	26
May 23	5.3	1.4	4.4	1.3	1.9	.8	....	8.6	.9	26
May 30	5.8	2.9	5.8	.9	2.2	1.0	....	9.6	.9	31
June 6	7.3	3.1	6.2	1.0	2.4	1.3	....	11	.8	35
June 13	7.5	2.0	6.3	1.5	2.4	.9	....	11	1.2	35
June 20	6.5	1.8	6.0	1.5	2.0	.8	....	11	.6	32
June 27	7.8	3.3	6.9	1.2	2.4	.9	....	9.7	.4	35
July 4	7.5	2.6	5.6	1.2	2.5	.9	....	9.4	.9	33
July 11	9.5	1.7	5.8	1.7	2.1	.8	....	11	2.6	37
July 18	8.1	3.2	7.2	1.7	2.5	.8	....	14	.9	41
July 25	10	4.1	6.1	1.5	2.7	1.2	....	12	3.0	43
Aug. 1	9.8	3.3	6.3	2.0	2.4	.9	....	13	3.9	44
Aug. 8	6.7	2.2	5.5	1.4	2.8	.7	....	9.6	3.5	34
Aug. 15	7.0	2.2	6.9	2.1	2.6	.8	....	14	3.7	41
Aug. 22	7.6	2.1	6.9	2.0	2.1	1.1	....	13	3.9	40
Aug. 29	6.8	4.0	7.9	1.6	2.8	1.0	....	12	3.9	43
Sept. 5	9.0	3.0	8.4	2.2	2.8	1.4	....	16	3.5	49
Sept. 12	7.4	1.8	5.9	1.1	2.2	.9	....	8.8	3.5	33
Sept. 19	9.9	4.9	7.7	1.7	3.4	.6	....	13	3.9	48
Sept. 26	6.2	2.7	8.8	.6	1.3	.7	....	14	3.0	40
Oct. 3	9.6	2.7	8.4	.7	3.2	.8	....	14	3.0	48
Oct. 10	9.3	3.1	14	.9	3.8	.9	....	8.9	1.2	51
Oct. 17	13	4.1	13	.6	3.4	.9	....	14	3.9	56
Oct. 24	8.3	4.9	11	1.5	3.0	.9	....	13	3.5	49
Oct. 31	9.4	3.9	7.5	.7	1.7	.7	....	13	3.0	39
Nov. 7	13	4.6	9.3	.6	1.9	1.6	....	14	3.5	52
Nov. 15	14	4.6	7.0	.7	3.2	1.2	....	8.8	3.3	47
Nov. 21	14	3.6	7.8	.8	3.7	1.2	....	16	3.5	52
Nov. 28	14	4.7	7.7	.7	3.4	1.1	....	12	3.5	52
Dec. 5	12	5.9	7.9	.3	3.0	1.2	....	9.1	1.2	45
Dec. 12	7.5	4.1	8.4	.5	2.6	.9	....	11	1.0	40
Dec. 19	10	3.2	11	.7	2.4	.8	....	6.4	1.2	49
Dec. 26	9.5	4.5	10	.6	3.3	1.5	....	16	3.5	53
Jan. 2	9.9	2.0	6.0	1.6	2.3	1.3	....	15	1.2	47
Jan. 9	11	5.5	9.3	.5	2.4	1.5	....	9.7	.9	47
Jan. 16	11	2.9	11	1.0	1.7	1.4	....	15	1.0	52
Jan. 23	10	4.2	8.5	.6	2.8	1.3	....	10	1.2	43
Jan. 30	8.0	1.8	6.0	.5	3.0	1.3	....	8.8	.5	34
Feb. 6	9.5	4.6	6.8	.5	2.7	1.4	....	11	.9	42
Feb. 13	11	2.5	7.2	1.7	2.6	1.3	....	17	1.2	50
Feb. 20	11	4.0	12	.8	2.2	1.2	....	15	.4	52
Feb. 27	14	4.3	7.9	.9	2.2	1.2	....	14	.8	49
Mar. 6	....	2.6	5.6	.8	2.5	1.2	....	9.4	3.0	53
Mar. 13	12	2.8	8.8	1.2	2.5	1.4	....	16	3.5	52
Mar. 20	14	4.9	10	1.2	3.6	1.5	....	16	3.5	56
Mar. 27	11	4.9	11	.9	2.3	1.3	....	12	3.3	52
Apr. 3	6.0	3.4	5.6	.6	1.9	1.0	....	6.1	2.8	31
Apr. 10	4.9	2.0	3.6	.8	2.0	.7	....	8.9	3.6	27
Apr. 17	4.0	1.0	3.4	.6	1.7	.8	....	8.7	3.0	24
Mean	9.0	3.2	7.4	1.1	2.5	1.0	....	12	2.3	42
Per ct. of anhydrous residue[b]	18.6	6.6	15.3	2.3	5.2	2.1	20.3	24.8	4.8	....

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[a] Analyses by F. C. Robinson.

[b] Based on the assumption that the average content of bicarbonates is 20 parts.

Mineral analyses of water from Arkansas River near Little Rock, Ark.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—															
Nov. 1	Nov. 10	270	172	0.64	31	0.30	84	18	351	0.0	230	136	1.8	535	1,285	3.5
Nov. 11	Nov. 20	140	96	.69	20	.30	86	22	381	.0	221	149	Tr.	568	1,339	3.6
Nov. 21	Dec. 2	140	135	.96	24	.9	39	11	123	.0	115	72	.5	186	519	5.2
Dec. 3	Dec. 19	1,000	894	.89	47	2.4	53	14	180	.0	142	95	.4	276	752	8.0
Dec. 20	Jan. 11	320	294	.92	31	1.2	25	8.9	60	.0	76	57	1.5	80	304	10.4
Dec. 14	Jan. 31	1,320	1,567	1.19	....	.....	40	13	62	.0	106	...	2.4	87	451	15.2
Feb. 2	Feb. 20	275	206	.75	20	.40	57	12	83	.0	155	63	3.8	107	433	8.6
Feb. 21	Mar. 7	220	228	1.04	16	.25	54	13	.....	.0	144	74	3.4	.....	460	8.1
Mar. 8	Mar. 28	450	413	.92	25	1.8	42	9.5	67	.0	131	61	1.2	82	366	9.5
Mar. 29	Apr. 12	235	233	.99	19	.8	45	11	80	.0	140	67	1.5	103	412	6.8
Apr. 13	Apr. 22	290	227	.78	20	.9	32	8.7	49	.0	106	42	1.2	65	287	7.3
Apr. 23	May 2	285	192	.67	22	1.2	42	11	74	.0	102	56	2.0	102	377	7.0
May 3	May 13	1,500	1,073	.72	54	1.8	27	6.9	33	.0	86	32	3.6	37	279	18.0
May 14	May 23	860	961	1.12	56	2.2	32	5.6	41	.0	92	43	6.3	40	305	17.4
May 24	June 2	450	460	1.02	40	1.0	31	2.7	31	.0	100	34	1.8	34	271	11.4
June 20	July 18	2,800	2,730	.97	20	.30	49	13	80	.0	181	72	2.8	87	414	10.6
July 19	Aug. 5	270	165	.61	18	.10	66	17	157	.0	196	103	1.1	213	695	5.3
Aug. 8	Aug. 17	1,000	834	.83	29	.15	96	20	415	.0	181	211	1.5	610	1,500	5.3
Aug. 18	Aug. 29	600	480	.80	13	.06	95	23	261	.0	195	212	4.4	347	1,093	4.0
Aug. 30	Sept. 8	3,000	4,119	1.37	36	.12	71	20	155	.0	189	153	1.3	181	736	5.0
Sept. 9	Oct. 6	280	162	.58	26	.33	72	17	179	[b] 8.4	184	117	.3	265	806	2.8
Oct. 7	Oct. 24	900	811	.90	26	.8	72	16	155	[b] Tr.	157	98	.2	262	774	3.3
Mean		755	748	.88	28	.82	55	13	144	.0	148	93	2.0	203	630	.....
Per ct. of anhydrous residue		......	......	.....	4.6	[c] .2	9.0	2.1	23.5	11.9	.....	15.2	.3	33.2	......	.....

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[a] Analyses November 1, 1906, to January 31, 1907, by W. M. Barr; February 2 to 20, 1907, by Henry S. Spaulding; February 21 to September 8, 1907, by Walton Van Winkle; September 9 to October 24, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Brazos River near Waco, Tex.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—															
Dec. 14	Dec. 25	675	669	0.99	23	Tr.	113	14	247	0.0	159	222	1.7	382	1,113	4.9
Dec. 26	Jan. 5	110	39	.35	15	0.5	126	20	313	.0	198	241	1.8	533	1,430	3.9
Jan. 6	Jan. 15	30	28	.93	12	.5	102	18	190	.0	197	181	3.5	315	952	3.8
Jan. 16	Jan. 25	30	43	1.44	12	Tr.	107	20	258	.0	182	231	1.7	392	1,128	3.6
Jan. 27	Feb. 6	10	9.6	.96	14	Tr.	129	27	373	.0	195	266	.8	575	1,513	3.6
Feb. 7	Feb. 16	10	18	1.80	16	Tr.	103	24	265	.0	204	197	1.1	354	1,114	3.5
Feb. 17	Feb. 26	20	25	1.25	11	.05	131	30	376	.0	190	276	4.4	564	1,532	3.4
Feb. 27	Mar. 10	20	18	.90	12	.03	77	19	257	.0	242	222	1.7	293	1,004	3.3
Mar. 11	Mar. 20	45	31	.69	12	.05	86	21	193	.0	190	175	.7	283	890	3.0
Mar. 21	Mar. 30	40	48	1.20	14	.05	93	20	267	.0	196	242	Tr.	322	1,068	3.7
Mar. 31	Apr. 9	30	13	.43	11	.10	81	19	182	.0	166	188	Tr.	253	808	3.3
Apr. 11	Apr. 21	75	48	.64	15	.20	88	22	184	.0	171	216	4.2	253	892	2.8
Apr. 22	May 1	20	21	1.05	12	.02	70	22	163	.0	163	202	1.1	228	826	2.6
May 2	May 11	3,100	1,935	.62	65	.9	71	19	94	.0	149	139	3.2	124	648	4.7
May 13	May 22	6,100	4,432	.73	60	1.1	70	7.8	82	.0	140	90	4.2	121	547	6.0
May 23	June 1	4,000	3,400	.85	11	.02	60	6.3	69	.0	118	84	5.6	119	420	7.0
June 2	June 11	6,800	4,936	.72	19	.15	104	13	......	.0	127	193	4.1	..	908	6.6
June 12	June 21	2,100	1,826	.87	9.6	.02	131	16	182	.0	110	320	5.1	297	1,077	4.8
June 22	July 1	6,400	5,350	.83	31	.5	218	26	346	.0	119	555	1.5	533	1,848	6.4
July 2	July 11	2,000	1,231	.62	26	.6	105	13	155	.0	136	260	2.2	201	848	4.4
July 12	July 22	5,400	4,482	.83	20	.07	136	23	201	.0	123	390	6.0	270	1,161	7.9
July 24	Aug. 2	1,650	1,090	.66	16	.16	99	16	108	.0	127	212	2.6	133	696	4.4
Aug. 3	Aug. 12	262	250	.95	27	.01	149	21	215	.0	133	324	.5	295	1,186	4.0
Aug. 13	Aug. 22	300	194	.65	26	.09	194	26	344	.0	134	494	.4	470	1,677	3.9
Aug. 23	Sept. 1	10	22	2.20	23	.09	178	27	308	.0	147	450	.4	451	1,618	3.5
Sept. 2	Sept. 10	5	......	.....	18	.10	182	28	326	.0	164	451	Tr.	468	1,638	3.0
Sept. 11	Sept. 20	8	29	3.62	59	.7	150	20	300	[b] 6.2	129	377	.	418	1,442	2.9
Sept. 21	Sept. 30	18	23	1.28	31	.26	162	15	306	[b] 3.6	140	402	...	427	1,458	3.0
Oct. 1	Oct. 10	2,200	2,270	1.03	21	.8	118	13	181	[b] 3.6	146	247	...	253	937	5.6
Nov. 11	Nov. 19	2,400	1,980	.83	29	.9	206	7.8	314	[b] 6.0	98	523	.....	482	1,695	5.0
Mean............		1,462	1,188	1.03	22	.26	121	19	234	.0	158	279	2.2	338	1,136	.....
Per ct. of anhydrous residue..		......	......	.....	2.0	[c] 0	11.1	1.7	21.4	7.1	.....	25.5	.2	31.0	......	.....

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[a] Analyses December 14, 1906, to February 6, 1907, by W. M. Barr; February 7 to February 26, 1907, by H. S. Spaulding; February 27 to September 10, 1907, by Walton Van Winkle; September 11 to November 19, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Cahaba River near Birmingham, Ala.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Nov. 1	Nov. 11	50	16	0.32	....	20	0.20	14	1.6	.....	0.0	46	.....	0.9	3.0	78	2.2
Nov. 12	Nov. 21	20	7.2	.36	....	20	.30	14	2.4	.....	.0	46	.....	.8	1.5	72	4.5
Nov. 22	Dec. 1	55	36	.65	....	21	.40	12	3.6	.....	.0	49	.....	.9	1.8	70	4.2
Dec. 3	Dec. 13	75	41	.55	....	23	.5	12	.....	.....	.0	51	.....	.7	1.5	74	3.6
Dec. 24	Jan. 2	100	74	.74	....	20	.40	8.8	0.8	.....	.0	29	.....	.8	2.5	73	8.8
Jan. 8	Jan. 19	15	9.6	.64	....	14	.20	9.9	1.2	.....	.0	34	.....	.9	3.4	66	4.8
Jan. 20	Jan. 31	15	12	.80	....	16	.6	13	.....	.....	.0	49	.....	.4	2.7	72	5.2
Feb. 1	Feb. 11	35	15	.43	....	23	.40	6.4	1.2	.....	.0	24	.....	.6	1.8	44	14.3
Feb. 12	Feb. 23	5	3.6	.72	....	8.6	.20	13	Tr.	.....	.0	41	.....	.2	1.5	53	4.2
Feb. 24	Mar. 5	18	15	.83	....	12	.20	11	1.2	.....	.0	34	.....	.5	1.5	49	11.6
Mar. 6	Mar. 15	25	20	.80	....	13	.30	12	1.6	.....	.0	41	.....	.3	2.5	59	5.6
Mar. 16	Mar. 25	10	7.0	.70	....	10	.30	14	1.2	.....	.0	46	.....	.4	2.0	59	3.7
Mar. 26	Apr. 4	10	7.6	.76	....	16	.30	15	2.8	.....	.0	54	.....	.3	1.5	75	2.9
Apr. 5	Apr. 14	25	23	.92	....	23	.30	18	1.6	.....	.0	58	.....	.3	3.0	92	4.0
Apr. 15	Apr. 24	90	82	.91	....	14	1.4	10	0.8	.....	.0	37	.....	.2	2.5	52	11.1
Apr. 25	May 2	265	260	.98	....	19	1.9	9.0	1.2	.....	.0	32	.....	.1	1.0	50	8.4
May 5	May 14	100	75	.75	....	14	1.2	7.1	3.0	8.8	.0	44	3.6	.7	2.0	62	9.0
May 15	May 24	35	29	.83	....	15	.40	8.5	3.6	6.0	.0	41	4.9	.6	2.5	68	12.2
May 25	June 3	130	119	.92	....	13	.8	8.9	2.9	7.4	.0	42	5.6	.3	2.5	66	8.0
June 4	June 13	10	10	1.00	....	22	.40	8.3	3.6	5.7	.0	53	4.6	.3	3.0	78	4.1
June 14	June 24	20	15	.75	....	18	.6	11	4.0	6.3	.0	60	6.9	.6	3.0	87	3.3
June 25	July 8	20	2.0	.10	....	21	.5	15	3.6	6.0	.0	76	9.5	.8	2.0	99	2.7
July 9	July 19	15	4.0	.27	....	19	.30	16	3.8	11	.0	74	10	.2	3.0	96	2.4
July 20	July 31	8	9.0	1.12	Tr.	19	Tr.	22	4.7	10	.0	84	11	1.0	2.4	107	2.7
Aug. 1	Aug. 11	7	8.4	1.20	Tr.	11	Tr.	.....	4.1	8.7	.0	55	9.5	1.2	3.0	88	2.1
Aug. 12	Aug. 21	5	9.0	1.80	Tr.	12	Tr.	20	4.0	12	.0	78	10	.8	2.2	99	2.2
Aug. 22	Sept. 5	5	5.6	1.12	Tr.	15	Tr.	23	2.9	12	[c]4.8	80	9.9	1.2	3.8	108	1.6
Sept. 29	Oct. 9	35	27	.77	1.0	.....	.8	14	2.7	11	[c]Tr.	70	12	.8	.6	127	2.1
Oct. 10	Oct. 22	8	12	1.50	.5	13	.22	16	3.0	10	[c]Tr.	60	12	.5	1.4	80	1.6
Oct. 23	Nov. 1	6	7.4	1.20	Tr.	10	Tr.	.....	3.0	12	.0	57	13	.3	2.4	86	1.4
Mean		40	32	.81	....	16	.44	13	2.5	9.1	.0	52	8.8	.6	2.2	76	.....
Per ct. of anhydrous residue		....	......	.....	....	20.4	[d].8	16.6	3.2	11.6	32.7	.....	11.2	.7	2.8	....	.....

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[a] Analyses November 1, 1906, to May 2, 1907, by J. R. Evans; May 14 to July 19, 1907, by W. D. Collins; July 31 to December 1, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station near Centerville, Ala., 75 miles above.

[c] Abnormal; computed as HCO_3 in the average.

[d] Fe_2O_3.

Mineral analyses of water from Cape Fear River at Wilmington, N. C.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Oct. 2	Oct. 8	11	10	0.91	1.2	10	0.6	5.4	1.0	6.3	0.0	22	2.6	0.0	6.0	64	5.4
Oct. 10	Oct. 23	c 16	c 17	c 1.06	c .9	c 10	c .7	c 7.2	c 7.6	c 67	c .0	c 20	c 12	c .0	c 130	c 247	c 4.9
Oct. 25	Nov. 5	11	7.8	.71	.5	8.8	.5	4.8	1.0	6.6	.0	20	2.6	.0	6.2	65	4.8
Nov. 6	Nov. 17	12	10	.83	.6	10	.6	4.6	1.0	6.9	.0	22	2.3	.0	6.5	63	3.6
Nov. 18	Nov. 27	9	8.2	.91	.5	10	.5	4.4	.8	5.7	.0	22	2.3	.0	6.0	59	4.0
Nov. 28	Dec. 7	11	11	1.00	.4	11	.4	5.0	1.0	5.8	.0	22	2.8	.0	6.2	52	2.9
Dec. 8	Dec. 17	14	13	.93	.4	12	.5	5.6	1.2	7.6	.0	29	3.3	.2	6.1	61	4.7
Dec. 18	Dec. 30	19	19	1.00	.9	10	.4	4.6	1.6	6.5	.0	20	2.5	Tr.	......	53	7.6
Dec. 31	Jan. 9	11	11	1.00	.8	10	.54	5.0	1.0	6.9	.0	...	3.1	.0	6.5	56	5.8
Jan. 10	Jan. 20	17	17	1.00	.9	8.2	.37	5.0	.6	5.3	.0	22	2.3	Tr.	5.8	44	4.3
Jan. 21	Feb. 1	11	10	.91	.6	10	.4	4.8	1.0	6.8	.0	22	2.8	.0	4.6	52	4.1
Feb. 2	Feb. 13	19	24	1.26	1.0	9.8	.53	4.8	1.0	5.6	.0	27	2.3	1.8	6.1	55	8.9
Feb. 14	Feb. 27	21	32	1.52	1.4	8.6	.61	3.8	.6	4.8	.0	18	2.5	Tr.	6.0	45	10.6
Feb. 28	Mar. 14	29	32	1.10	1.5	7.6	.81	3.8	.6	4.9	.0	21	2.8	.3	5.0	47	13.7
Mar. 15	Mar. 26	29	42	1.45	2.3	18	1.8	4.0	.8	6.4	.0	23	2.6	.0	4.6	65	11.3
Mar. 27	Apr. 6	27	25	.93	1.6	11	1.0	4.4	.8	.....	.0	22	2.8	.4	5.8	50	6.4
Apr. 8	Apr. 18	42	28	.67	2.3	......	2.1	4.2	.6	....	....	....	2.5	1.0	......	.....	10.1
Apr. 19	Apr. 30	32	24	.75	1.9	15	1.7	4.4	1.0	6.9	.0	22	2.6	.75	4.6	62	12.5
May 1	May 11	31	25	.81	1.6	14	1.1	4.4	1.4	6.8	.0	24	1.6	.5	6.1	60	10.9
May 13	May 24	28	20	.71	1.2	8.0	.35	4.2	1.0	7.7	.0	20	2.0	.5	6.0	52	6.0
May 25	June 6	25	15	.60	1.0	7.0	.28	4.6	.8	7.9	.0	22	1.6	.5	6.6	50	10.4
June 8	June 21	28	25	.89	1.4	9.2	.75	4.2	1.0	9.0	.0	24	1.6	.5	6.2	58	10.9
June 24	July 4	32	26	.81	1.8	7.2	.65	4.8	1.2	6.1	.0	26	2.0	.3	7.0	62	9.6
July 6	July 17	....	43	.....	1.2	2.6	.13	6.6	.6	11	.0	34	4.0	.0	4.8	48	5.4
July 19	Aug. 1	....	24	.....	1.4	7.6	.88	5.4	1.8	6.6	.0	26	5.4	Tr.	5.4	57	4.4
Aug. 2	Aug. 12	....	18	.....	1.5	6.2	.61	6.4	.6	9.1	.0	29	6.9	Tr.	4.8	56	4.0
Aug. 13	Aug. 24	20	16	.80	1.4	11	1.1	5.5	2.0	12	.0	41	5.8	Tr.	5.4	66	6.6
Aug. 26	Sept. 5	20	19	.95	1.4	8.8	.77	6.5	.8	5.7	.0	24	5.1	Tr.	5.0	61	5.8
Sept. 6	Sept. 18	75	52	.69	4.0	14	1.8	5.6	1.8	8.5	.0	28	5.3	.5	6.6	68	6.4
Sept. 30	Oct. 9	15	14	.93	1.4	11	.79	8.3	1.8	12	.0	39	5.6	Tr.	7.0	75	3.7
Mean		73	21	.92	1.3	9.9	.78	5.0	1.5	7.2	.0	25	3.2	.2	5.8	57	.....
Per ct. of anhydrous residue		....	......	.....	.....	21.6	[d]2.4	10.9	3.3	15.7	26.1	....	7.0	.4	12.6	.....	.....

[a] Analyses October 2 to November 27, 1906, by R. B. Dole; November 28, 1906, to April 6, 1907, by R. B. Dole and M. G. Roberts; April 8 to July 4, 1907, by Chase Palmer and M. G. Roberts; July 6 to October 9, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station near Fayetteville, N. C., 75 miles above.

[c] Abnormal; omitted from the average.

[d] Fe_2O .

Mineral analyses of water from Cedar River near Cedar Rapids, Iowa.[a]

[Parts per million, unless otherwise stated.]

Date (1906–7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO^3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—															
Sept. 6	Sept. 15	80	51	0.64	20		29	18	14	[b] 4.8	153	24	0.0	4.3	171	3.5
Sept. 16	Sept. 25	60	59	.98	25	0.10	32		8.7	.0	149	27	2.4	3.0	203	4.1
Sept. 27	Oct. 6	50	20	.40	26	.10	48	16		.0	217	23	3.2	4.0	236	4.1
Oct. 7	Oct. 16	20	26	1.30	23	Tr.	55	21	15	.0	246	28	4.4	3.2	269	3.4
Oct. 17	Oct. 27	15	29	1.94	26	Tr.	52	19	20	.0	229	29	.4	3.3	248	3.3
Oct. 28	Nov. 6	20	16	.80	27	Tr.	58	20	11	.0	255	29	1.8	4.6	277	3.7
Nov. 7	Nov. 16	10	8.4	.84	17	Tr.	60	19	14	.0	263	28	2.2	3.5	285	3.5
Nov. 17	Nov. 26	20	17	.85	15	.05	64	20	16	.0	262	33	2.6	3.8	281	3.6
Nov. 27	Dec. 6	25	20	.80	17	.04	51	20	15	.0	240	33	.9	3.8	258	4.0
Dec. 7	Dec. 16	15	13	.87	21	.10	62	22	17	.0	273	37	4.4	3.8	309	3.7
Dec. 17	Dec. 26	5.0	2.8	.56	13	.10	64	26	16	.0	309	40	4.8	4.0	311	4.3
Dec. 27	Jan. 5	80	56	.70	12	.20	51	17	13	.0	207		4.4	3.1	228	4.2
Jan. 6	Jan. 15	20	22	1.10	9.2	.08	47	17	9.7	.0	175		5.2	2.5	193	4.4
Jan. 16	Jan. 26	75	71	.95	15	Tr.	42	13	13	.0	167	29	3.6	2.3	193	4.9
Jan. 27	Feb. 5	5.0	4.0	.80	11	.05	61	19	......	.0	258	31	5.2	3.9	260	4.5
Feb. 6	Feb. 15	80	68	.85	6.4	.05	58	15	14	.0	221	46	5.2	4.8	242	4.2
Feb. 16	Feb. 26	30	35	1.17	4.6	.10	24	6.6	11	.0	87	21	5.8	2.2	119	5.7
Feb. 27	Mar. 7	70	69	.99	9.8	.25	26	9.6	14	.0	....	35	4.6	2.2	151	5.3
Mar. 8	Mar. 19	65	54	.83	14	.18	32	12	12	.0	...	21	3.8	8.8	178	4.7
Mar. 20	Mar. 29	30	37	1.24	12	.15	37	9.4	16	.0	149	26	2.6	2.7	175	4.6
Mar. 30	Apr. 8	135	84	.62	15	Tr.	41	14	9.9	.0	175	29	2.8	2.3	203	4.7
Apr. 9	Apr. 18	30	25	.83	11	.03	53	16	......	.0	213	34	2.6	2.7	246	4.0
Apr. 19	Apr. 28	10	Tr.	......	3.0	.05	54	19	8.1	.0	210	46	.6	3.9	250	3.6
Apr. 29	May 8	10	Tr.	......	3.0	.05	51	20	8.6	.0	230	35	Tr.	3.8	241	3.6
May 9	May 18	10	Tr.	.....	4.0	.01	48	21	11	.0	226	33	.5	3.4	241	3.3
May 19	May 28	95	98	1.03	5.8	.18	...	17	9.8	.0	204	32	3.0	4.2	225	3.4
May 29	June 8	55	57	1.04	11	.02	43	16	8.8	.0	207	.....	2.2	3.4	230	3.7
June 9	June 18	140	174	1.24	14	.02	47	14	7.0	.0	179	29	4.8	1.9	215	5.4
June 19	June 28	80	124	1.55	10	.05	48	13	9.8	.0	209	28	4.2	2.6	244	5.0
June 29	July 9	235	214	.91	15	.15	49	11	15	.0	201	22	8.0	2.9	230	4.5
July 10	July 19	390	356	.91	20	.48	38	11	6.4	.0	145	22	3.1	....	179	6.3
July 20	July 29	105	108	1.03	14	.05	43	13	12	.0	189	22	2.8	2.5	207	6.4
July 30	Aug. 8	65	58	.89	15	.01	55	15	15	.0	234	27	4.4	4.0	248	4.8
Aug. 9	Aug. 18	140	154	1.10	20	.20	40	13	8.6	.0	166	22	2.2	2.8	192	5.2
Aug. 19	Aug. 28	50	62	1.24	10	.05	42	14	9.1	.0	198	23	2.3	3.3	213	4.5
Aug. 29	Sept. 7	50	53	1.06	20	.15	51	14	11	.0	201	29	1.6	2.5	228	4.6
Sept. 8	Sept. 17	10	Tr.	......	13	.18	57	18	10	.0	253	31	1.9	3.8	253	3.8
Mean		64	61	.97	14	.09	48	16	12	.0	209	30	3.1	3.4	228	....
Per ct. of anhydrous residue		.....	.....	......	6.1	[c] 1	20.9	7.0	5.2	44.8	.....	13.0	1.4	1.5	...	....

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[a] Analyses September 6, 1906, to February 15, 1907, by W. M. Barr; February 16 to 26, 1907, by H. S. Spaulding; February 27 to September 17, 1907, by Walton Van Winkle.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Chattahoochee River at West Point, Ga.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 20	Oct. 29	85	50	0.59	......	16	1.0	6.6	1.2	.....	0.0	24	....	0.0	2.0	50	4.2
Oct. 30	Nov. 8	45	25	.56	......	30	.6	3.6	.8	.....	.0	19	....	.4	2.5	60	3.4
Nov. 9	Nov. 18	65	37	.57	......	20	.20	5.7	Tr.	.....	.0	22	....	.4	1.5	54	3.5
Nov. 19	Nov. 29	70	24	.34	......	26	.7	6.8	1.6	.....	.0	27	....	.6	3.0	71	4.1
Nov. 30	Dec. 9	60	37	.62	......	30	.8	6.0	2.8	.....	.0	24	....	.7	2.8	77	3.3
Dec. 10	Dec. 19	55	34	.62	......	32	.5	6.4	2.4	.....	.0	29	....	.4	3.0	81	4.1
Dec. 21	Jan. 1	130	96	.74	......	32	.9	3.9	Tr.	.....	.0	15	....	.7	1.5	60	4.8
Jan. 2	Jan. 11	85	65	.76	......	24	.7	2.3	.8	.....	.0	......	....	.8	2.5	55	5.3
Jan. 12	Jan. 21	25	14	.56	......	17	.10	4.7	.8	.....	.0	17	....	.8	3.5	59	3.7
Jan. 22	Jan. 31	15	9.0	.60	......	24	.30	7.4	1.6	.....	.0	29	....	.5	3.5	59	3.5
Feb. 1	Feb. 10	220	169	.77	......	33	1.2	3.6	1.6	.....	.0	......	....	.4	1.8	53	7.2
Feb. 11	Feb. 26	55	42	.76	......	18	.9	4.8	Tr.	.....	.0	15	....	.3	...	56	3.8
Feb. 27	Mar. 8	260	205	.79	......	25	1.3	4.4	Tr.	.....	.0	15	....	.3	1.5	53	7.7
Mar. 9	Mar. 18	290	166	.57	......	24	.9	5.6	Tr.	.....	.0	20	....	.4	2.5	53	3.8
Mar. 19	Mar. 28	30	26	.87	......	11	1.0	6.4	Tr.	.....	.0	22	....	.2	2.5	40	3.6
Mar. 29	Apr. 7	285	264	.92	......	28	1.4	6.8	Tr.	.....	.0	22	....	.4	3.0	59	3.5
Apr. 8	Apr. 17	190	220	1.16	......	27	1.1	2.0	Tr.	.....	.0	9.8	....	1.6	1.5	40	3.7
Apr. 18	Apr. 27	185	175	.95	......	18	1.0	2.5	Tr.	.....	.0	9.8	....	1.3	2.0	33	5.9
Apr. 28	May 7	185	165	.89	......	16	1.3	3.5	.8	.....	.0	12	....	1.1	1.5	34	4.6
May 8	May 18	350	279	.80	16	22	.03	4.9	1.1	8.8	[b] 8.4	13	4.8	.9	....	57	5.1
May 19	May 28	115	76	.66	7.9	23	.03	5.2	1.9	9.2	[b] 8.4	21	5.0	.9	1.3	65	3.6
May 29	June 7	260	166	64	10	14	.03	3.0	.6	10	.0	26	4.0	1.2	1.7	47	3.7
June 8	June 17	130	91	.70	2.4	16	.03	3.2	1.1	7.2	[b] 3.6	21	3.5	.0	1.0	45	3.1
June 18	June 27	120	81	.67	5.8	11	.00	5.1	1.2	6.7	.0	16	7.6	.7	1.7	42	2.8
June 28	July 7	340	246	.72	13	12	.00	4.9	.7	7.0	[b] Tr.	27	4.0	1.1	2.0	45	3.2
July 9	July 18	450	448	1.00	35	9.0	.00	4.3	.9	7.6	.0	28	3.0	1.0	1.2	36	3.0
July 19	July 28	325	214	.66	12	13	.00	4.0	1.1	8.1	.0	24	3.8	1.1	1.2	40	2.6
July 29	Aug. 7	375	289	.77	21	12	.03	6.0	1.3	9.4	.0	37	6.6	1.2	4.8	63	2.7
Aug. 8	Aug. 17	400	220	.55	10	14	Tr.	3.2	1.0	7.9	.0	24	4.0	1.1	1.8	47	2.6
Aug. 18	Aug. 27	375	242	.64	6.6	15	Tr.	4.2	.6	6.3	.0	28	4.2	1.1	2.0	48	2.6
Aug. 28	Sept. 6	225	121	.54	3.7	17	Tr.	4.9	.5	6.5	.0	27	4.8	1.0	1.8	60	2.0
Sept. 17	Sept. 26	155	129	.83	5.2	12	Tr.	5.1	.8	6.6	.0	27	4.3	.7	1.3	46	2.6
Sept. 27	Oct. 8	185	100	.54	12	18	Tr.	4.9	.4	9.0	.0	29	4.1	1.0	1.8	54	2.5
Oct. 9	Oct. 18	140	98	.70	4.4	8.9	Tr.	5.7	1.0	5.8	.0	27	3.5	.6	1.7	42	2.1
Mean		185	136	.71	......	20	.47	4.8	.8	7.7	.0	23	4.5	.7	2.1	52	....
Per ct. of anhydrous residue..		.....	.....	.....	......	38.0	[c] 1.3	9.1	1.6	14.6	21.5	.....	8.5	1.4	4.0	....	....

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[a] Analyses October 20, 1906, to May 7, 1907, by Jas. R. Evans; May 8 to October 18, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Chippewa River near Eau Claire, Wis.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—															
Sept. 14	Sept. 23	5	Tr.	.....	24	0.20	11	3.7	8.4	0.0	45	12	Tr.	3.2	111	6.4
Sept. 24	Oct. 3	10	Tr.	.....	11	.30	12	4.0	7.1	.0	44	9.0	1.8	2.1	98	6.1
Oct. 4	Oct. 13	5	Tr.	.....	5.8	.20	12	5.1	9.4	.0	45	14	Tr.	1.2	98	5.0
Oct. 14	Oct. 23	5	4.8	0.96	16	.15	13	6.3	7.0	.0	59	19	Tr.	1.3	103	4.9
Oct. 24	Nov. 2	5	9.6	1.92	15	.15	10	5.2	8.1	.0	39	16	Tr.	2.9	102	7.8
Nov. 3	Nov. 12	5	[a]4.8	.96	12	Tr.	16	5.2	8.6	.0	41	13	Tr.	2.3	109	6.8
Nov. 13	Nov. 22	5	Tr.	.....	12	Tr.	12	4.2	.....	.0	33	14	Tr.	1.5	87	6.4
Nov. 23	Dec. 2	15	6.4	.43	16	Tr.	10	.....	7.5	.0	39	17	.0	.9	93	6.5
Dec. 3	Dec. 13	10	4.8	.48	17	.40	12	4.2	9.2	.0	40	19	.0	1.2	94	5.4
Dec. 14	Dec. 25	5	2.8	.56	15	.30	14	4.9	10	.0	53	17	.0	2.0	101	5.2
Dec. 26	Jan. 4	5	Tr.	.....	15	.25	14	5.7	7.3	.0	36	.....	.9	1.5	97	5.0
Jan. 5	Jan. 17	5	Tr.	.....	10	.25	16	5.3	.....	.0	58	13	Tr.	.....	94	4.9
Jan. 18	Jan. 27	10	6.4	.64	12	.40	15	5.8	13	.0	61	9.9	.2	2.7	96	.....
Jan. 28	Feb. 7	5	Tr.	.....	15	.25	17	4.8	5.6	.0	70	12	.8	.4	109	.....
Feb. 8	Feb. 18	5	4.0	.80	15	.25	17	8.5	11	.0	66	10	1.4	.6	97	.....
Feb. 19	Feb. 28	5	Tr.	.....	15	.25	17	4.1	8.7	.0	65	12	1.8	1.6	95	.....
Mar. 1	Mar. 10	5	Tr.	.....	18	.6	19	6.6	7.6	.0	68	15	1.2	1.5	104	.....
Mar. 11	Mar. 20	5	3.2	.64	12	.30	14	.....	9.1	.0	60	16	2.1	2.3	100	5.1
Mar. 21	Mar. 31	20	34	1.70	4.6	.37	......	2.8	5.4	.0	25	15	1.2	1.5	59	11.2
Apr. 1	Apr. 10	10	10	1.00	6.8	.19	6.2	3.7	5.2	.0	.....	18	1.1	.4	58	11.2
Apr. 11	Apr. 20	5	7.6	1.52	6.8	.15	11	2.4	8.5	.0	22	14	.9	.1	72	7.9
Apr. 21	Apr. 30	Tr.	Tr.	.....	12	.18	9.8	3.7	4.6	.0	29	17	Tr.	.7	73	7.0
May 1	May 12	Tr.	Tr.	.....	9.6	.24	......	5.2	4.4	.0	39	16	Tr.	Tr.	72	7.3
May 13	May 22	5	Tr.	.....	7.4	.18	8.2	2.3	......	.0	28	11	Tr.	.1	63	8.7
May 23	June 1	5	Tr.	.....	7.0	.19	7.0	2.4	4.9	.0	28	9.9	Tr.	2.4	89	8.2
June 2	June 11	5	Tr.	.....	5.8	.16	10	3.0	4.3	.0	38	8.7	.8	Tr.	68	6.6
June 12	June 21	5	Tr.	.....	5.2	.25	10	4.3	5.9	.0	46	15	Tr.	.2	87	6.0
June 22	July 1	5	Tr.	.....	10	.18	15	.....	9.5	.0	56	14	1.2	.8	90	6.0
July 3	July 12	10	9.2	.92	9.8	.20	13	4.4	7.6	.0	45	15	1.0	.2	81	6.3
July 13	July 22	5	Tr.	.....	10	.30	14	.....	7.3	.0	.....	10	.5	.3	84	5.1
July 23	Aug. 2	7	Tr.	.....	12	.21	17	.....	10	.0	59	9.9	Tr.	.3	93	4.8
Aug. 3	Aug. 13	5	Tr.	.....	14	.15	16	6.9	8.6	.0	61	......	4.4	.3	90	.45
Aug. 14	Aug. 23	20	22	1.10	13	.19	16	.....	11	.0	55	12	Tr.	Tr.	94	.47
Aug. 24	Sept. 2	5	Tr.	.....	11	.09	13	5.2	13	.0	59	12	.4	.3	88	.44
Sept. 3	Sept. 12	5	Tr.	.....	14	.12	16	6.1	11	.0	72	15	.3	1.0	108	.42
Mean		7.0	3.7	.97	12	.22	13	4.7	8.1	.0	48	14	.6	1.1	90	.....
Per ct. of anhydrous residue		.....	.....	.....	15.5	[b].4	16.8	6.1	10.5	30.5	.....	18.0	.8	1.4	.....	.....

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[a] Analyses September 14, 1906, to February 7, 1907, by W. M. Barr; February 8 to February 28, 1907, by H. S. Spaulding; March 1 to September 12, 1907, by Walton Van Winkle.
[b] Fe_2O_3.

Mineral analyses of water from Colorado River at Austin, Tex.[a]

[Parts per million, unless otherwise stated.]

Date (1905-6).		Suspended matter.	Silica (SiO_2).	Oxides of iron and aluminum ($Fe_2O_3+Al_2O_3$).	Calcium (Ca).	Magnesium (Mg).	Sodium (Na).	Potassium (K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—													
Aug. 1	Aug. 10	2,480	19	3.6	53	7.9	30	1.8	0.0	177	41	34	300	2.5
Aug. 11	Aug. 20	28	23	4.0	58	12	42	3.6	.0	199	52	37	322	1.4
Aug. 21	Aug. 30	22	28	1.4	53	15	45	5.3	.0	171	38	47	316	.9
Aug. 31	Sept. 9	24	26	2.8	69	16	58	3.6	.0	220	39	44	296	.9
Sept. 10	Sept. 18	144	27	1.4	56	14	48	7.5	.0	212	45	53	326	1.3
Sept. 22	Sept. 29	124	25	2.6	57	15	103	7.0	.0	156	110	137	498	1.7
Sept. 30	Oct. 9	276	30	1.0	73	15	52	4.3	.0	187	60	98	432	1.4
Oct. 10	Oct. 19	302	20	1.8	49	10	72	11	.0	175	34	32	244	1.7
Oct. 20	Oct. 29	742	27	2.0	52	10	49	8.3	.0	161	37	40	248	1.8
Oct. 31	Nov. 8	148	21	2.4	47	9.1	......	......	.0	174	29	32	226	1.0
Nov. 10	Nov. 19	466	22	1.8	54	13	......	......	.0	173	33	38	252	1.9
Nov. 20	Nov. 29	46	19	2.4	47	12	......	......	.0	173	34	41	246	1.1
Nov. 30	Dec. 9	60	17	3.2	46	15	30	3.6	.0	197	24	49	268	1.0
Dec. 10	Dec. 19	26	14	1.8	47	17	31	4.4	.0	201	21	44	280	1.1
Dec. 20	Dec. 29	18	15	1.2	47	19	27	1.2	.0	223	18	48	294	1.1
Dec. 30	Jan. 8	50	10	2.0	53	20	32	4.3	.0	238	26	56	366	1.1
Jan. 9	Jan. 18	36	8.8	4.6	54	21	34	3.8	.0	238	28	53	330	.9
Jan. 19	Jan. 28	0	9.0	2.8	49	21	34	4.0	.0	228	29	60	324	1.0
Jan. 29	Feb. 7	22	10	3.2	48	21	38	3.5	.0	220	24	55	298	.9
Feb. 8	Feb. 17	76	14	3.4	51	22	35	3.4	.0	219	29	48	290	1.1
Feb. 18	Feb. 27	10	12	3.6	47	22	34	3.6	.0	214	25	51	306	1.1
Feb. 28	Mar. 9	38	9.0	1.2	48	24	35	4.0	.0	218	42	66	324	.9
Mar. 10	Mar. 19	42	......	1.6	48	23	19	4.0	.0	221	39	59	320	.9
Mar. 20	Mar. 29	14	8.8	1.8	49	24	......	......	.0	223	35	86	336	1.2
Mar. 30	Apr. 8	94	14	2.4	52	21	39	......	.0	239	35	56	338	1.4
Apr. 9	Apr. 18	114	11	2.6	59	25	44	......	.0	217	46	75	320	1.4
Apr. 19	Apr. 28	82	14	3.0	48	24	64	......	.0	204	80	79	402	2.7
Apr. 29	May 8	78	14	6.4	56	24	53	3.5	.0	205	89	75	426	1.4
May 9	May 18	90	18	6.8	68	24	77	4.9	.0	180	112	113	536	1.2
May 19	May 28	600	14	3.6	45	21	90	4.4	.0	184	102	134	550	2.6
May 29	June 7	1,256	19	4.8	57	8.7	51	4.3	.0	154	37	67	294	3.3
June 8	June 17	844	35	7.0	62	17	36	4.2	[b]18	151	30	55	270	3.7
June 18	June 27	484	21	2.8	41	13	51	9.9	.0	166	43	57	308	1.8
June 28	July 7	400	17	4.4	40	6.8	25	8.9	.0	160	18	26	220	2.5
July 8	July 17	1,508	13	4.6	45	10	31	6.9	.0	177	28	52	268	4.9
July 18	July 27	1,882	21	4.4	40	6.5	11	9.2	.0	133	14	24	178	5.3
Mean............		351	18	3.1	52	17	44	5.1	.0	195	42	59	321	......
Per ct. of anhydrous residue..		......	5.4	.9	15.5	5.1	13.1	1.5	28.5	......	12.5	17.5	......	......

[a] Analyses by W. H. Heileman.

[b] Abnormal; computed as HCO_3 in the average.

Mineral analyses of water from Cumberland River near Nashville, Tenn.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 24	Nov. 3	75	58	0.77	.....	29	4.0	33	3.2	.....	0.0	115	.....	0.6	2.0	139	8.8
Nov. 4	Nov. 13	28	15	.54	.....	26	.20	26	1.2	.....	.0	90	.....	.7	3.5	112	8.0
Nov. 14	Nov. 23	30	15	.50	.....	27	.30	24	1.2	.....	.0	76	.....	.8	3.0	109	18.1
Nov. 24	Dec. 3	35	16	.46	.....	28	.20	24	2.0	.....	.0	81	.....	.8	2.5	106	17.1
Dec. 4	Dec. 13	50	37	.74	.....	29	.20	22	2.8	.....	.0	83	.....	.6	2.8	111	9.5
Dec. 14	Dec. 23	75	50	.67	.....	28	.30	27	3.6	.....	.0	85	.....	.5	3.0	114	20.0
Dec. 24	Jan. 2	135	108	.80	.....	33	.20	27	2.8	.....	.0	85	.....	.8	1.0	128	21.3
Jan. 3	Jan. 12	150	132	.88	.....	22	.30	23	.....	.....	.0	81	.....	.6	1.8	110	25.0
Jan. 13	Jan. 22	60	41	.68	.....	31	.10	26	3.6	.....	.0	93	.....	1.0	1.7	118	15.1
Jan. 23	Feb. 1	75	46	.61	.....	20	.40	21	4.4	.....	.0	78	.....	.6	2.0	106	18.7
Feb. 2	Feb. 11	65	40	.62	.....	13	.30	26	3.6	.....	.0	90	.....	.4	2.0	107	14.2
Feb. 12	Feb. 23	90	78	.87	.....	21	.30	22	3.2	.....	.0	83	.....	.3	1.0	97	11.4
Feb. 24	Mar. 5	180	156	.87	.....	31	.30	23	3.6	.....	.0	.....	.....	.4	1.2	114	29.8
Mar. 6	Mar. 16	350	322	.92	.....	31	.10	22	.....	.....	.0	78	.....	.5	1.0	112	28.7
Mar. 17	Mar. 26	110	96	.87	.....	25	.30	24	.....	.....	.0	81	.....	.4	2.0	112	22.1
Mar. 27	Apr. 5	70	62	.88	.....	15	.30	27	4.0	.....	.0	93	.....	.5	2.0	107	10.3
Apr. 6	Apr. 15	135	130	.96	.....	27	.10	20	5.2	.....	.0	78	.....	.2	1.5	100	18.7
Apr. 16	Apr. 25	45	48	1.07	.....	9.6	Tr.	17	7.6	.....	.0	76	.....	1.8	1.5	87	11.6
Apr. 26	May 5	95	119	1.25	.....	12	.20	18	.....	.....	.0	78	.....	1.6	2.0	91	10.3
May 6	May 15	75	63	.84	.....	11	.20	18	6.4	.....	.0	73	.....	1.1	.....	88	24.3
May 15	May 24	85	.....	.....	.....	20	.30	30	3.2	5.7	.0	98	16	2.7	1.4	128	14.0
May 25	June 3	80	48	.60	.....	24	.20	.....	4.5	2.9	.0	110	14	2.0	1.5	150	10.2
June 4	June 13	425	318	.74	.....	20	.8	31	4.1	7.9	.0	100	16	4.3	2.4	146	16.8
June 14	June 23	110	85	.77	.....	17	.35	22	4.1	5.7	.0	82	18	3.2	1.4	121	14.4
June 24	July 3	245	140	.57	.....	14	.24	29	4.7	6.0	.0	115	16	1.9	1.8	138	9.3
July 4	July 14	100	60	.60	.....	15	.25	32	4.5	8.9	.0	113	14	1.4	2.4	140	8.2
July 15	July 25	30	.....	.....	.....	12	.25	31	5.8	11	.0	.....	14	.9	4.8	140	8.1
July 26	Aug. 4	70	38	.54	.....	13	.12	32	.....	8.6	.0	113	9.7	1.7	2.0	122	7.8
Aug. 5	Aug. 14	195	185	.95	.....	7.8	.03	33	.....	13	.0	118	14	1.7	3.3	127	8.0
Aug. 15	Aug. 24	110	52	.47	.....	5.2	.20	36	1.8	15	.0	115	20	.6	2.0	135	7.5
Aug. 25	Sept. 3	80	67	.84	.....	8.2	.20	33	.....	10	.0	102	14	1.6	1.5	125	7.8
Sept. 5	Sept. 14	250	130	.52	.....	14	.45	26	.....	8.2	.0	95	17	.8	2.0	128	8.2
Sept. 25	Oct. 13	450	224	.49	12	24	1.3	26	1.4	11	.0	90	10	1.6	1.8	127	8.8
Oct. 14	Oct. 24	215	82	.38	6.1	28	1.0	24	3.0	16	[b]Tr.	95	13	1.3	3.6	140	8.0
Oct. 25	Nov. 3	45	41	.91	3.0	19	.9	27	0.9	14	[b]Tr.	99	12	1.0	2.4	130	7.4
Mean		126	94	.74	.....	20	.42	26	3.6	9.6	.0	92	14	1.2	2.1	119	.....
Per ct. of anhydrous residue		....	....	.....	.....	16.4	[c]5	21.3	2.9	7.8	37.0	.....	11.4	1.0	1.7	.....	.....

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[a] Analyses October 24, 1906, to May 15, 1907, by Jas. R. Evans; May 15 to September 14, 1907, by Waltop Van Winkle; September 25 to November 3, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal, computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Cumberland River near Kuttawa, Ky.[a]

[Parts per million, unless otherwise stated.]

Date (1907-8).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—																
Jan. 11	Jan. 20	45	29	0.64	.....	29	0.20	27	7.2	.....	0.0	110	.....	0.6	2.7	147	17.1
Jan. 21	Feb. 2	95	68	.72	.....	18	.40	24	3.6	.....	.0	78	.....	1.0	1.7	.....	24.2
Feb. 3	Feb. 12	70	38	.54	.....	25	.30	24	3.6	.....	.0	85	.....	.4	1.5	118	16.3
Feb. 13	Feb. 23	170	136	.80	.....	25	.10	23	.....	.....	.0	85	.....	.6	1.5	104	11.7
Feb. 24	Mar. 7	320	260	.81	.....	31	.20	22	4.8	.....	.0	.....	.....	.3	1.8	108	36.8
Mar. 8	Mar. 17	290	217	.75	.....	38	.40	24	3.2	.....	.0	80	.....	.8	1.5	122	33.4
Mar. 18	Mar. 27	180	164	.91	.....	23	.20	22	5.6	.....	.0	.....	.....	.5	2.5	108	27.5
Mar. 28	Apr. 6	85	60	.71	.....	18	.20	26	.....	.....	.0	102	.....	.4	3.0	124	9.7
Apr. 7	Apr. 16	35	20	.57	.....	10	.10	27	4.0	.....	.0	83	.....	.9	1.5	96	21.1
Apr. 17	Apr. 26	100	85	.85	.....	7.6	.20	26	3.6	.....	.0	80	.....	2.2	2.0	91	10.9
Apr. 27	May 6	95	106	1.12	.....	8.4	Tr.	25	4.8	.....	.0	80	.....	2.9	4.0	94	9.9
May 6	May 15	340	470	1.38	.....	11	.6	27	4.2	8.2	.0	99	7.1	5.0	1.0	112	34.7
May 17	May 26	130	174	1.34	.....	17	.30	31	4.6	7.2	.0	118	7.2	3.0	4.0	131	16.6
May 27	June 5	120	134	1.12	.....	11	.40	33	5.4	4.4	.0	121	13	1.5	4.0	137	10.1
June 6	June 16	490	796	1.62	.....	17	.8	25	3.1	.....	.0	101	6.9	1.7	2.0	122	22.3
June 17	June 28	180	150	.83	.....	14	.40	27	3.4	8.0	.0	105	6.7	2.5	3.5	123	11.1
June 29	July 8	80	71	.89	.....	16	.20	31	3.9	.....	.0	126	8.2	1.9	3.5	137	5.5
July 9	July 18	142	107	.75	.....	12	.20	34	4.2	9.1	.0	.....	8.1	1.5	4.0	135	4.3
July 19	July 29	20	38	1.90	1.0	17	.07	34	4.8	8.2	3.6	111	8.7	1.4	3.9	136	3.7
July 30	Aug. 8	25	35	1.40	1.1	27	.06	36	5.7	10	2.4	124	8.7	1.8	4.2	153	2.8
Aug. 9	Aug. 22	200	123	.62	6.1	24	.26	35	4.6	9.5	2.4	123	8.6	1.6	3.8	152	4.1
Sept. 2	Sept. 11	220	119	.54	6.6	19	.24	35	5.6	11	4.8	112	11	1.4	5.0	149	3.0
Sept. 12	Sept. 21	350	258	.74	12	26	1.2	28	4.6	8.5	Tr.	100	13	3.8	3.0	145	6.9
Sept. 22	Oct. 1	300	224	.75	12	19	.9	21	3.6	6.6	Tr.	73	9.0	3.5	4.2	108	6.2
Oct. 2	Oct. 11	220	170	.77	10	16	.52	29	4.1	6.4	Tr.	96	10	2.2	3.0	125	4.1
Oct. 12	Oct. 21	200	189	.95	11	7.4	.24	28	4.0	6.9	7.2	82	10	.8	3.0	107	4.9
Oct. 22	Oct. 31	150	82	.55	6.6	16	.35	31	4.7	9.4	Tr.	115	10	2.4	5.0	133	1.9
Nov. 1	Nov. 10	90	74	.82	3.5	9.2	.11	34	5.2	7.1	4.8	107	11	2.2	4.8	129	4.0
Nov. 11	Nov. 21	270	287	1.06	12	12	.32	31	4.8	9.0	4.8	99	13	2.0	3.8	128	9.3
Nov. 22	Dec. 1	220	268	1.22	10	13	.54	30	3.7	6.9	Tr.	102	11	2.0	3.0	141	13.0
Dec. 2	Dec. 11	170	112	.66	3.3	17	.04	22	3.4	8.5	.0	.....	10	2.4	2.4	105	7.5
Dec. 12	Dec. 21	70	71	1.02	2.2	14	.04	32	2.2	5.4	.0	106	11	2.3	2.4	126	7.2
Dec. 22	Dec. 31	260	253	.97	7.9	15	.15	34	4.6	8.2	.0	110	12	3.0	2.2	137	14.8
Jan. 1	Jan. 11	240	238	.99	8.0	15	.10	27	3.1	5.7	.0	84	8.9	2.0	2.2	111	.....
Mean		176	165	.92	.....	18	.30	28	4.3	7.8	.9	100	9.7	1.8	3.0	124	.....
Per ct. of anhydrous residue		....	....	.....	.....	14.6	[c].4	22.8	3.5	6.3	40.6	.....	7.9	1.5	2.4	.....	.....

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[a] Analyses January 11 to May 6, 1907, by Jas. R. Evans; May 6 to July 18, 1907, by W. D. Collins; July 19, 1907, to January 11, 1908, by R. B. Dole, Chase Palmer and W. D. Collins.

[b] Gaging station at Clarkesville, Tenn., 70 miles above.

[c] Fe_2O_3.

Mineral analyses of water from Dan River at South Boston, Va.[a]

[Parts per millon, unless otherwise stated.]

Date (1906-7.) From—	Date (1906-7.) To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
Sept 3	Sept. 13	210	126	0.60	8.9	26	1.4	6.0	2.8	4.2	0.0	41	1.3	Tr.	2.4	75	3.2
Oct. 1	Oct. 11	260	175	.67	9.8	31	2.1	5.2	1.8	7.6	.0	34	2.5	0.8	2.6	82	4.2
Oct. 12	Oct. 21	43	42	.98	2.4	50	.7	6.0	2.2	8.5	.0	39	2.6	Tr.	3.1	100	4.3
Oct. 22	Oct. 31	31	25	.81	1.4	23	.6	5.2	2.0	7.6	.0	36	2.3	Tr.	2.4	61	4.8
Nov. 1	Nov. 11	17	33	1.94	1.0	17	.07	5.2	1.6	5.2	.0	34	2.8	.6	3.4	52	2.5
Nov. 12	Nov. 21	230	181	.79	8.4	21	1.3	4.8	1.2	5.4	.0	30	3.3	1.6	2.7	67	2.7
Nov. 22	Dec. 1	28	131	.47	2.0	16	.3	5.6	1.4	6.3	.0	32	4.3	.6	2.6	54	2.3
Dec. 2	Dec. 12	21	76	3.62	3.5	18	.28	5.4	1.8	4.9	.0	35	1.6	.5	3.0	50	2.3
Dec. 13	Dec. 23	220	664	3.00	16	26	2.2	4.4	1.6	6.8	.0	33	4.3	1.1	3.4	78	2.6
Dec. 24	Dec. 31	350	742	2.12	24	23	1.8	4.6	1.8	6.0	.0	29	4.3	1.6	2.9	69	3.5
Jan. 3	Jan. 13	55	525	9.54	10	16	.35	4.8	1.8	6.2	.0	31	2.8	1.6	3.4	54	4.5
Jan. 20	Jan. 29	110	815	7.41	9.5	21	1.0	5.6	2.0	6.5	.0	40	3.1	Tr.	4.1	75	2.7
Jan. 30	Feb. 9	90	215	2.39	6.5	23	1.0	6.2	2.0	6.2	.0	40	3.5	.2	3.6	77	2.8
Feb. 10	Feb. 19	175	324	1.85	11	23	2.2	5.4	1.0	6.5	.0	25	4.1	2.1	2.9	75	3.1
Feb. 20	Mar. 2	110	209	1.90	8.0	25	2.2	6.0	1.2	6.6	.0	24	5.8	1.8	2.5	84	2.9
Mar. 3	Mar. 12	380	677	1.78	9.0	24	2.4	5.8	.6	7.7	.0	26	4.0	1.9	3.1	86	5.1
Mar. 13	Mar. 24	47	231	4.90	5.3	18	.33	7.8	.8	6.8	.0	28	5.3	2.4	4.1	66	4.6
Mar. 25	Apr. 3	27	45	1.67	1.4	16	.08	6.8	.8	9.5	[b]16	3.0	5.1	.0	5.3	64	2.6
Apr. 4	Apr. 13	225	150	.67	10	28	1.0	6.0	1.1	9.4	.0	40	3.6	3.0	3.1	88	4.9
Apr. 14	Apr. 23	38	44	1.16	2.3	18	.24	5.6	1.6	6.3	.0	29	2.5	1.8	3.4	55	2.7
Apr. 24	May 2	98	110	1.12	6.5	31	1.1	5.6	1.0	8.2	.0	30	2.8	1.8	4.2	86	4.2
Mean		132	264	2.35	7.5	24	1.1	5.6	1.5	6.8	.0	33	3.4	1.1	3.2	71	....
Per ct. of anhydrous residue		....	....	.....	.....	38.0	[c]2.5	8.9	2.4	10.7	25.3	......	5.4	1.7	5.1	....	....

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[a] Analyses September 3 to October 31, 1906, by R. B. Dole; November 1, 1906, to April 3, 1907, by R. B. Dole and M. G. Roberts; April 4 to May 2, 1907, by Chase Palmer and M. G. Roberts.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Delaware River at Lambertville, N. J.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7.)		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Sept. 8	Sept. 17	2	.....	.....	....	22	0.20	14	4.4	5.7	0.0	59	9.9	0.5	2.6	94	2.80
Sept. 18	Sept. 26	13	15	1.15	0.1	12	Tr.	16	5.2	6.9	.0	63	13	.5	3.1	87	2.64
Sept. 28	Oct. 7	85	62	.73	.3	17	.20	15	3.8	5.7	.0	61	17	.5	2.8	94	3.17
Oct. 8	Oct. 17	5	5	1.00	.1	13	Tr.	16	3.2	5.5	.0	52	15	.6	3.2	85	3.16
Oct. 18	Oct. 29	18	50	2.77	.8	16	Tr.	12	1.6	5.2	.0	38	12	.5	2.8	75	4.67
Oct. 30	Nov. 9	6	6.4	1.07	.1	7.2	Tr.	10	1.8	5.7	.0	37	10	.8	2.6	58	4.74
Nov. 10	Nov. 19	5	2	.40	.1	8.0	.06	10	2.4	5.4	.0	36	14	.7	2.6	61	4.39
Nov. 20	Nov. 29	9	9.2	1.02	.2	6.0	Tr.	7.8	1.0	4.9	.0	28	9.2	.8	1.8	46	5.64
Nov. 30	Dec. 9	3	1.2	.40	Tr.	8.0	Tr.	9.4	2.2	.....	.0	35	11	.8	1.9	55	4.62
Dec. 10	Dec. 19	5	1.4	.28	.2	6.4	.12	9.2	3.4	3.6	.0	....	9.2	1.6	2.6	51	4.92
Dec. 20	Dec. 30	6	5.8	.97	.2	7.6	.11	10	3.6	3.6	.0	37	11	2.0	2.9	58	4.80
Dec. 31	Jan. 9	43	78	1.81	2.1	7.6	.14	9.0	3.0	3.9	.0	....	.....	1.4	2.4	50	7.12
Jan. 10	Jan. 19	8	10	1.25	.4	5.8	.11	9.0	3.2	3.0	.0	....	9.6	1.6	2.4	47	5.98
Jan. 20	Jan. 30	8	9.2	1.15	.3	6.6	.09	9.5	3.4	3.8	.0	....	11	1.8	2.4	51	5.39
Jan. 31	Feb. 9	3	3.2	1.06	.2	7.2	.14	10	4.0	3.3	.0	35	11	1.6	2.9	57	4.66
Feb. 10	Feb. 19	6	8.8	1.47	.2	6.0	.04	12	4.2	5.8	.0	....	13	1.9	2.6	65	.....
Feb. 20	Mar. 1	12	16	1.33	.1	.....	.06	12	4.0	6.6	.....	....	11	.5	2.6	76	.....
Mar. 2	Mar. 11	7	7.0	1.00	.3	12	.06	13	4.6	.....	[b]4.3	41	14	2.1	2.9	77	3.75
Mar. 12	Mar. 22	39	96	2.46	1.9	3.0	.05	8.4	2.6	5.7	.0	35	11	1.1	2.6	49	7.19
Apr. 2	Apr. 12	2	5.2	2.60	.3	7.4	.09	8.9	2.9	3.8	.0	....	9.9	1.5	2.6	50	5.20
Apr. 13	Apr. 22	1	2.8	2.80	.2	7.2	.09	9.4	1.9	4.4	.0	32	9.6	1.0	2.2	52	4.89
May 4	May 13	7	15	2.14	.3	8.6	.05	9.7	3.5	5.0	.0	41	9.2	.6	2.2	59	4.94
May 14	May 23	4	12	3.00	.5	11	.07	10	3.0	6.3	.0	41	9.7	1.0	2.6	66	3.34
May 24	June 2	4	12	3.00	.4	7.4	.11	10	3.7	5.7	.0	43	9.7	.7	2.5	62	4.21
June 4	June 13	4	10	2.50	.5	5.6	.10	9.1	3.3	.....	.0	30	10	.7	2.6	52	4.79
June 14	June 23	4	9.0	2.25	.3	3.4	.11	11	3.8	3.8	.0	43	10	.6	3.2	58	3.88
June 25	July 4	9	21	2.33	.4	4.8	.09	12	4.0	5.4	.0	44	12	1.4	3.0	66	4.10
July 5	July 14	90	126	1.40	1.6	.....	.05	14	5.0	.....	.....	....	16	Tr.	3.0	101	3.73
July 15	July 24	65	72	1.11	1.8	14	.13	16	.....	8.8	.0	....	15	1.5	3.0	85	3.52
July 25	Aug. 3	15	41	2.73	1.0	7.2	.04	16	.....	6.9	.0	52	16	1.1	4.0	83	2.57
Aug. 4	Aug. 13	10	45	4.50	.9	11	.04	17	.....	6.6	.0	61	18	1.1	4.0	94	2.29
Aug. 15	Aug. 25	30	63	2.10	1.2	4.8	.04	19	.....	7.9	.0	66	18	1.7	5.4	94	2.32
Aug. 26	Sept. 4	12	31	2.58	.7	11	.06	19	.....	.....	.0	72	19	1.6	4.8	109	2.83
Sept. 5	Sept. 12	12	11	.92	.6	13	.03	17	.....	9.1	.0	66	17	1.5	3.6	101.	4.02
Mean		16	26	1.74	.6	9.0	.07	12	3.3	5.4	.0	46	12	1.1	2.9	70	.....
Per ct. of anhydrous residue		....	.....	.....	....	13.1	[c].2	17.5	4.8	7.9	33.2	....	17.5	1.6	4.2	....	.....

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[a] Analyses September 8 to December 9, 1906, by R. B. Dole; December 10, 1906, to March 22, 1907, by R. B. Dole and M. G. Roberts; April 2 to July 4, 1907, by Chase Palmer and M. G. Roberts; July 5 to September 12, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Des Moines River at Keosauqua, Iowa.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—														
Sept. 10	Sept. 19	275	216	0.78	35	Tr.	50	21	27	0.0	233	51	2.2	4.5	303
Sept. 20	Sept. 29	425	514	1.21	23	.10	47	12	20	.0	188	40	2.5	4.8	256
Sept. 30	Oct. 9	150	132	.88	23	.10	58	......	14	.0	233	49	2.2	4.8	294
Oct. 10	Oct. 19	65	46	.71	32	.10	68	34	17	.0	......	......	1.8	6.1	368
Oct. 20	Oct. 29	20	24	1.20	31	Tr.	70	30	31	.0	......	92	.6	8.1	396
Oct. 30	Nov. 8	115	132	1.15	23	.05	64	25	20	.0	......	65	3.1	5.4	336
Nov. 9	Nov. 18	50	63	1.26	22	.05	71	28	19	.0	272	......	1.3	3.5	361
Nov. 19	Nov. 28	60	55	.92	17	.05	80	28	26	.0	310	90	1.8	5.1	399
Nov. 29	Dec. 8	85	72	.85	26	.15	74	27	22	.0	315	91	2.0	5.3	407
Dec. 9	Dec. 18	30	24	.80	27	.05	83	28	18	.0	......	96	3.5	5.5	431
Dec. 19	Dec. 28	5	Tr.	(?)	18	.10	100	38	27	.0	412	107	2.6	8.1	492
Dec. 29	Jan. 7	525	460	.88	34	......	61	22	18	.0	220	83	2.6	4.6	345
Jan. 8	Jan. 17	135	116	.86	20	.9	50	17	13	.0	167	61	4.4	6.5	259
Jan. 18	Jan. 27	235	211	.90	29	1.2	30	10	11	.0	99	52	3.9	4.0	207
Jan. 28	Feb. 8	40	23	.57	18	.45	48	17	16	.0	168	69	1.4	6.5	261
Feb. 10	Feb. 19	220	182	.83	23	.5	65	23	18	.0	231	104	2.2	8.5	346
Feb. 20	Mar. 1	95	94	.99	14	.35	40	13	16	.0	134	61	5.1	4.7	214
Mar. 2	Mar. 12	650	752	1.16	20	1.0	41	14	12	.0	129	60	7.5	5.3	245
Mar. 13	Mar. 22	950	1,063	1.12	23	.9	43	15	22	.0	......	79	7.3	3.8	258
Mar. 23	Mar. 31	450	566	1.26	18	.6	45	16	18	.0	175	64	4.2	3.3	258
Apr. 2	Apr. 11	300	287	.96	18	.5	55	19	13	.0	218	62	2.6	3.5	288
Apr. 12	Apr. 21	75	99	1.32	15	.10	67	24	17	.0	266	76	4.0	3.9	339
Apr. 22	May 1	35	66	1.89	19	.05	66	30	20	.0	274	89	.5	6.2	386
May 2	May 11	20	......	......	11	.15	71	24	20	.0	266	105	Tr.	8.8	383
May 12	May 21	80	106	1.32	5.2	.05	57	27	19	.0	238	94	1.1	9.6	335
May 22	May 31	1,740	1,667	.96	30	1.0	53	19	13	.0	175	82	3.4	3.7	316
June 1	June 10	1,750	2,113	1.21	18	.5	51	16	12	.0	154	74	6.3	2.8	275
June 11	June 20	1,400	2,033	1.45	26	.8	......	17	10	.0	......	67	9.5	2.5	303
June 21	June 30	1,200	1,328	1.11	21	.16	60	19	12	.0	218	62	2.8	2.1	299
July 1	July 10	1,300	2,035	1.56	24	.6	55	20	15	.0	214	69	3.3	4.6	296
July 11	July 20	1,670	1,939	1.16	33	.8	......	......	13	.0	155	44	6.2	2.5	231
July 21	July 30	1,100	1,268	1.15	17	.16	42	14	8.4	.0	185	35	1.9	1.2	212
July 31	Aug. 9	830	910	1.10	33	.12	62	21	7.1	.0	249	52	5.0	1.8	310
Aug. 11	Aug. 20	2,400	2,591	1.08	31	.6	47	13	19	.0	175	51	7.1	2.8	259
Aug. 21	Aug. 30	550	456	.83	9.2	.04	64	22	23	.0	243	71	2.0	5.0	327
Aug. 31	Sept. 9	500	844	1.69	......	.18	49	16	20	.0	165	....	2.2	3.4	251
Mean		542	642	1.09	22	.36	58	21	17	.0	216	71	3.3	4.8	312
Per ct. of anhydrous residue		.....	......	......	7.2	[b].2	19.0	6.9	5.6	35.0	....	23.4	1.1	1.6	....

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[a] Analyses September 10, 1906, to February 19, 1907, by W. M. Barr; February 20 to March 1, 1907, by H. S. Spaulding; March 2 to September 9, 1907, by Walton Van Winkle.

[b] Fe_2O_3.

Mineral analyses of water from Lake Erie at Buffalo, N. Y.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).	Turbidity.	Suspended matter.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg.)	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
Sept. 19	2	....	11	0.13	33	7.1	7.2	4.1	118	12	0.40	8.0	143	572.27
Oct. 19	2	....	11	.08	32	6.8	6.3	4.8	116	11	.00	7.9	138	572.25
Nov. 19	17	....	4.2	.04	31	7.4	5.8	.0	124	12	Tr.	8.2	129	572.32
Dec. 19	24	....	7.6	.04	31	7.4	6.8	3.6	118	13	Tr.	8.6	136	572.45
Jan. 19	190	....	2.9	.07	30	7.4	6.4	.0	117	13	.25	9.2	126	572.96
Mar. 19	13	....	4.5	.10	31	7.5	5.8	2.2	112	14	.25	9.2	132	572.22
Apr. 19	....	....	8.6	.06	30	8.2	6.9	1.4	108	13	.35	8.4	129	572.62
May 25	....	....	4.7	.05	31	7.9	6.5	4.0	104	14	.6	8.6	132	572.84
June 19	....	....	4.6	.03	31	7.9	6.7	5.3	110	13	.45	8.8	131	573.18
July 19	....	....	3.9	.03	32	7.8	7.1	5.2	110	14	.50	9.2	134	573.33
Aug. 28	....	....	2.1	.18	31	8.0	5.9	3.4	112	13	.35	8.6	128	573.02
Mean	41	Tr.	5.9	.07	31	7.6	6.5	3.1	114	13	.3	8.7	133	....
Per ct. of anhydrous residue	....	....	4.5	[b].1	23.4	5.7	4.9	44.8	....	9.8	.2	6.6	....	....

[a] Analyses by R. B. Dole and M. G. Roberts.
[b] Fe_2O_3.

Mineral analyses of water from Flint River near Albany, Ga.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).[b]	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).[c]	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—															
Oct. 23	Nov. 1	120	64	0.53	47	....	6.8	3.6	....	0.0	29	....	1.8	3.0	84	4.3
Nov. 2	Nov. 11	45	31	.69	19	0.8	11	4.8	....	.0	51	....	.4	3.0	80	1.8
Nov. 12	Nov. 21	17	4	.24	25	.20	11	Tr.	....	.0	32	....	.9	2.5	74	2.3
Nov. 22	Dec. 1	20	8	.40	27	.30	12	1.2	....	.0	34	....	.6	2.0	77	3.0
Dec. 2	Dec. 11	25	11	.44	33	.20	12	1.2	....	.0	37	....	.7	2.2	90	1.9
Dec. 12	Dec. 21	35	18	.51	34	.5	14	1.6	....	.0	49	....	.5	2.5	93	2.1
Dec. 22	Dec. 31	40	17	.42	20	.9	6.0	.8	....	.0	29	....	.8	3.0	68	3.8
Jan. 1	Jan. 11	35	20	.07	18	.8	6.2	1.2	....	.0	22	....	.5	3.0	62	5.4
Jan. 12	Jan. 22	20	15	.75	22	.10	8.1	.8	....	.0	34	....	.8	4.0	63	2.8
Jan. 23	Feb. 2	12	7	.58	16	.8	7.0	.8	....	.0	24	....	1.1	5.5	52	3.0
Feb. 2	Feb. 11	120	89	.74	36	.9	5.6	.8	....	.0	22	....	.4	2.0	66	7.9
Feb. 12	Feb. 21	60	53	.88	22	1.1	6.8	.8	....	.0	22	....	.7	4.0	70	5.8
Feb. 22	Mar. 3	65	45	.69	14	1.2	8.4	1.2	....	.0	27	....	.1	2.5	47	3.8
Mar. 4	Mar. 13	85	64	.75	18	1.4	8.8	1.2	....	.0	29	....	.4	3.0	54	5.8
Mar. 14	Mar. 23	40	36	.90	12	.7	6.4	.8	....	.0	22	....	.3	1.5	39	4.1
Mar. 24	Apr. 2	30	30	1.00	24	1.4	10	1.2	....	.0	37	....	.7	3.0	72	2.1
Apr. 3	Apr. 12	60	50	.83	19	.8	10	.8	....	.0	34	....	.3	2.5	59	3.8
Apr. 13	Apr. 22	160	156	.98	23	.9	9.5	2.5	....	.0	34	....	.3	2.0	60	3.6
Apr. 23	May 2	460	376	.82	27	1.3	9.0	1.6	....	.0	34	....	.2	3.5	66	9.4
May 3	May 12	560	....	....	33	2.1	7.0	1.2	....	.0	24	....	.1	2.0	60	7.2
Mean		100	58	.67	24	.86	8.8	1.4	[b]7.0	.0	31	[c]6.0	.6	2.8	67	....
Per ct. of anhydrous residue[d]		....	....	....	35.8	[e]1.8	13.0	2.1	10.4	22.8	....	9.0	.9	4.2	....	....

[a] Analyses by J. R. Evans.
[b] Fluctuates between 2 and 10 parts. Average value about 7 parts.
[c] Fluctuates between trace and 8 parts. Average value about 6 parts.
[d] Approximate.
[e] Fe_2O_3.

Mineral analyses of water from Grand River at Grand Rapids, Mich.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 1	Oct. 10	10	39	3.90	0.3	10	Tr.	55	19	10	7.2	220	29	0.7	9.6	256	0.1
Oct. 11	Oct. 20	8	10	1.25	Tr.	19	Tr.	59	20	13	11	244	23	1.0	7.9	277	− .2
Oct. 21	Oct. 30	7	9	1.29	Tr.	22	Tr.	60	21	13	Tr.	269	24	.7	6.7	277	.1
Oct. 31	Nov. 9	4	5.2	1.30	....	16	0.04	62	21	11	4.8	254	29	1.5	7.9	282	.4
Nov. 10	Nov. 19	3	2.8	.93	....	16	.03	65	22	9.0	13	244	31	1.5	8.2	290	.1
Nov. 20	Nov. 29	19	22	1.16	.05	17	.03	63	21	7.4	9.1	234	37	3.0	7.9	286	2.1
Dec. 1	Dec. 11	5	4.0	.80	.16	21	.03	67	20	8.7	.0	246	47	5.0	6.7	303	1.6
Dec. 12	Dec. 29	7	7.0	1.00	.2	15	.03	69	22	6.6	.0	246	49	7.0	8.8	311	1.8
Jan. 2	Jan. 10	375	255	.68	4.9	11	.12	52	16	7.9	.0	198	39	6.0	6.2	240	4.5
Jan. 11	Jan. 23	....	46	......	2.1	13	.3	45	13	7.4	4.3	148	34	6.0	6.7	210	6.6
Jan. 24	Feb. 6	21	34	1.62	1.3	21	.07	45	14	6.3	4.1	158	32	3.1	4.0	198	10.4
Feb. 7	Feb. 17	28	65	2.32	.5	5.6	.04	41	21	11	14	172	42	.....	6.5	219	6.8
Feb. 18	Feb. 27	9	19	2.11	.4	24	.07	64	19	8.7	17	198	42	4.0	5.8	283	5.4
Feb. 28	Mar. 9	38	76	2.00	1.1	2.8	.05	41	15	8.2	.....	.....	36	1.7	4.8	201	5.0
Mar. 10	Mar. 19	42	65	1.55	1.8	6.6	.09	42	13	7.9	18	145	30	1.5	4.3	195	6.0
Mar. 20	Mar. 29	55	86	1.57	2.6	6.0	.12	42	12	6.0	8.4	146	26	2.0	4.1	191	7.1
Mar. 30	Apr. 8	34	36	1.06	1.1	11	.08	47	14	9.1	11	162	30	4.0	7.8	219	6.3
Apr. 9	Apr. 19	7	18	2.57	.5	15	.04	58	18	13	15	202	35	3.5	7.2	269	2.8
Apr. 20	May 1	36	35	.97	1.2	15	.10	60	18	11	16	207	35	2.5	7.8	272	2.0
May 2	May 12	36	40	1.11	1.4	16	.12	50	15	11	12	179	30	2.0	6.0	235	5.7
May 13	May 24	9	13	1.44	.4	26	.08	60	19	9.7	7.2	232	35	4.0	9.0	292	1.6
May 25	June 4	26	23	.88	.5	9.6	.10	61	19	13	12	231	33	3.0	9.6	280	1.7
June 5	June 14	5	15	3.00	.6	8.2	.05	61	19	15	7.2	235	35	2.0	7.8	279	1.0
June 15	June 24	20	45	2.25	.8	8.0	.14	60	20	14	7.2	238	30	1.0	7.4	269	.4
June 25	July 4	9	20	2.22	.4	13	.06	60	20	10	.0	257	28	1.7	10	273	.5
July 5	July 15	15	30	2.00	1.0	15	.05	61	22	13	.....	.....	31	Tr.	9.8	270	.2
July 16	July 25	200	172	.86	4.4	21	.09	59	20	12	14	204	30	1.6	9.4	265	1.2
July 26	Aug. 6	40	56	1.40	1.6	10	.06	59	20	9.8	7.2	229	32	.2	9.4	259	.6
Aug. 7	Aug. 16	20	41	2.05	.8	15	.05	60	22	10	11	226	32	.8	8.6	266	.3
Aug. 17	Aug. 26	15	31	2.07	1.1	12	.05	58	23	8.8	12	217	31	1.4	9.4	263	.3
Aug. 27	Sept. 5	20	36	1.80	1.0	24	.05	59	22	15	.0	249	35	1.2	12	286	.3
Sept. 6	Sept. 15	15	22	1.47	1.2	14	.04	58	22	9.1	7.2	228	30	1.5	9.0	263	.2
Sept. 16	Sept. 25	70	84	1.20	2.6	2.4	.06	53	18	9.3	13	182	30	Tr.	8.2	232	.3
Sept. 26	Oct. 5	12	15	1.25	.5	20	.04	59	21	15	9.6	237	29	2.0	8.6	277	.6
Mean		37	43	1.61	1.1	14	.07	56	19	10	8.5	214	33	2.3	7.7	258	.....
Per ct. of anhydrous residue		....	.....	......	....	5.5	[b] .0	21.9	7.4	3.9	44.5	.....	12.9	.9	3.0	.....	.....

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[a] Analyses October 1, 1906, to November 29, 1906, by R. B. Dole; January 2 to March 29, 1907, by R. B. Dole and M. G. Roberts; March 30 to July 4, 1907, by Chase Palmer and M. G. Roberts; July 5 to October 5, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Hudson River at Hudson, N. Y.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—															
Sept. 17	Sept. 27	10	11	1.10	0.6	19	0.2	24	4.4	7.9	0.0	87	16	Tr.	3.8	131
Sept. 28	Oct. 7	9	9	1.00	.4	15	.2	24	4.2	7.9	.0	80	17	0.5	5.3	129
Oct. 8	Oct. 17	6	7	1.17	.2	9.0	.1	26	3.8	10	.0	80	20	.9	5.6	131
Oct. 18	Oct. 28	7	11	1.57	.3	13	.05	26	3.8	11	.0	82	20	.7	5.3	135
Oct. 29	Nov. 7	8	11	1.37	.....	13	.18	25	4.8	9.9	.0	79	21	.9	4.1	125
Nov. 8	Nov. 17	8	10	1.25	.....	15	.16	22	4.4	10	.0	77	21	.9	4.1	123
Nov. 18	Nov. 27	18	13	.72	.8	13	.2	20	4.2	7.9	.0	71	15	1.0	3.0	112
Nov. 28	Dec. 8	9	10	1.11	.3	8.6	.15	18	3.8	6.3	.0	63	12	.5	2.6	96
Dec. 9	Dec. 18	8	6.0	.75	.6	8.0	.08	20	4.2	7.3	.0	72	16	1.6	4.3	99
Dec. 19	Dec. 28	8	6.8	.85	.5	11	.06	24	5.0	7.6	.0	83	18	1.5	4.4	114
Dec. 29	Jan. 8	39	40	1.02	1.4	7.4	.1	18	4.0	6.3	.0	60	14	1.8	2.9	88
Jan. 9	Jan. 18	31	30	.97	1.1	12	.16	15	3.4	4.6	.0	52	12	1.2	3.4	82
Jan. 19	Jan. 27	13	21	1.62	.6	5.6	.09	18	4.0	5.0	.0	57	15	1.1	3.6	86
Jan. 31	Feb. 9	6	6.4	1.07	.4	9.6	.12	21	4.6	5.0	.0	67	16	1.6	4.1	103
Feb. 10	Feb. 20	18	32	1.78	.4	4.2	.1	19	4.8	6.6	.0	70	17	.0	4.3	99
Feb. 21	Mar. 2	9	11	1.22	.8	9.6	.13	24	5.0	5.7	.0	77	19	2.0	5.0	118
Mar. 3	Mar. 12	6	2.6	.43	.4	27	.13	25	4.8	5.8	.0	76	21	2.1	5.0	129
Mar. 13	Mar. 22	20	21	1.05	1.1	13	.13	20	4.0	4.9	.0	63	16	2.1	4.2	98
Mar. 23	Apr. 1	34	54	1.59	2.1	5.6	.13	16	2.2	5.0	[b]7.9	43	9.7	.3	1.2	63
Apr. 2	Apr. 12	15	16	1.07	.5	15	.09	16	1.2	9.8	.0	61	13	1.3	2.9	94
Apr. 13	Apr. 22	13	19	1.46	.7	9.2	.12	16	1.4	6.9	.0	56	10	1.0	3.0	82
Apr. 23	May 2	30	33	1.10	1.4	13	.16	16	1.4	9.4	.0	56	12	.9	2.4	87
May 3	May 12	12	15	1.25	.6	12	.13	.....	1.0	5.0	.0	48	12	.8	2.4	77
May 13	May 22	7	9.0	1.29	.5	9.0	.15	16	1.2	7.6	.0	62	11	.8	2.4	84
May 23	June 1	6	11	1.83	.5	10	.15	18	1.4	6.3	.0	.....	13	.6	3.4	96
June 2	June 11	7	10	1.43	.5	5.4	.11	18	1.8	......	.0	63	......	.5	3.4	92
June 12	June 21	6	9.6	1.60	.4	4.8	.11	20	2.0	6.9	.0	.....	14	.5	3.4	93
June 22	July 1	29	34	1.17	1.0	6.6	.09	22	4.0	9.5	[b]12	56	14	Tr.	6.2	103
July 2	July 11	20	30	1.50	.8	9.2	.12	.....	5.4	9.8	[b]12	60	19	.0	5.8	117
July 12	July 21	4	11	2.75	.8	16	.40	22	4.6	11	.0	83	17	Tr.	3.8	122
July 22	July 31	9	13	1.44	.8	11	.11	26	4.6	12	.0	92	20	Tr.	3.4	127
Aug. 1	Aug. 10	7	2.2	.31	.7	10	.21	26	5.0	9.4	.0	88	20	Tr.	5.0	127
Aug. 11	Aug. 21	8	23	2.88	.8	......	.14	26	5.4	9.3	[b]4.8	84	19	.0	5.4	125
Aug. 22	Sept. 1	7	6.6	.94	.7	8.0	.23	26	5.4	9.8	.0	95	21	.0	5.4	131
Sept. 2	Sept. 11	9	6.8	.76	.9	8.8	.42	26	5.8	8.8	.0	87	22	Tr.	5.8	133
Sept. 12	Sept. 22	11	12	1.09	.7	13	.10	26	5.4	9.4	.0	85	23	Tr.	4.2	132
Mean		13	16	1.26	.7	11	.15	21	3.8	7.9	.0	73	16	.8	4.0	108
Per ct. of anhydrous residue		....	.....	......	.....	10.9	[c].2	20.9	3.8	7.8	35.7	.....	15.9	.8	4.0	....

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[a] Analyses September 17 to December 8, 1906, by R. B. Dole; December 9, 1906, to April 1, 1907, by R. B. Dole and M. G. Roberts; April 2 to July 1, 1907, by Chase Palmer and M. G. Roberts; July 2 to September 22, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Lake Huron at Port Huron, Mich.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).	Turbidity.	Suspended matter.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Sept. 21	1	....	13	0.02	24	6.4	3.5	3.4	97	4.8	0.30	2.5	108	581.12
Oct. 21	2	....	8.7	.10	24	6.3	3.7	3.6	96	6.2	.25	2.5	105	580.87
Nov. 21	Tr.	....	8.0	.05	24	6.7	3.0	.0	100	5.6	.4	2.6	101	580.68
Dec. 21	Tr.	....	12	.05	23	6.7	3.5	.0	103	6.6	.3	3.1	106	580.65
Jan. 21	......	....	12	.03	23	7.1	5.8	.0	99	6.7	.4	2.5	108	580.65
Mar. 21	......	....	14	.03	22	7.2	4.7	1.2	101	6.7	.3	2.5	109	580.68
Apr. 21	......	....	14	.04	24	7.7	5.1	Tr.	106	6.0	.45	2.6	110	580.90
May 21	......	....	14	.05	25	7.6	5.9	2.4	102	7.3	.4	2.8	116	581.08
June 21	......	....	8.5	.04	24	7.5	4.7	5.3	96	6.4	.45	2.8	105	581.39
Mean	Tr.	Tr.	12	.04	24	7.0	4.4	1.8	100	6.2	.4	2.6	108	....
Per ct. of anhydrous residue	......	....	11.1	[c].0	22.3	6.5	4.1	47.4	.....	5.8	.4	2.4	......	....

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[a] Analyses by R. B. Dole and M. G. Roberts.

[b] Gaging station at Harbor Beach, Mich., 60 miles above.

[c] Fe_2O_3.

Mineral analyses of water from Iowa River at Iowa City, Iowa.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—														
Sept. 6	Sept. 15	90	64	0.71	28	......	57	20	17	[b]7.7	245	31	0.2	3.8	253
Sept. 16	Sept. 25	105	74	.70	28	0.30	47	18	19	.0	222	.....	1.8	5.0	264
Sept. 26	Oct. 6	125	86	.69	24	.10	51	21	13	.0	223	36	1.7	6.7	265
Oct. 7	Oct. 16	75	62	.83	22	.10	56	23	14	.0	273	32	1.1	4.0	273
Oct. 17	Oct. 26	50	51	1 02	36	Tr.	64	26	13	.0	283	44	.5	3.9	312
Oct. 27	Nov. 5	25	22	.88	21	Tr.	63	22	12	.0	262	35	1.3	5.4	289
Nov. 6	Nov. 15	20	13	.65	14	Tr.	60	20	16	.0	268	30	1.5	4.4	291
Nov. 16	Nov. 25	15	14	.93	10	.10	59	21	17	.0	275	36	Tr.	3.7	276
Nov. 26	Dec. 5	35	29	.83	15	.15	53	20	16	.0	253	36	4.4	4.5	270
Dec. 6	Dec. 16	20	13	.65	26	.10	61	18	16	.0	282	42	4.4	4.0	312
Dec. 17	Jan. 4	70	41	.59	27	.05	61	24	......	.0	281	31	3.5	4.0	306
Jan. 5	Jan. 15	135	102	.76	14	.6	23	10	11	.0	90	31	5.2	2.1	139
Jan. 16	Jan. 28	115	87	.76	18	.7	21	7.5	......	.0	83	30	1.7	2.7	134
Jan. 29	Feb. 7	10	7.2	.72	.12	.15	39	15	14	.0	160	39	2.3	3.4	196
Feb. 8	Feb. 17	15	26	1.73	8.8	.07	44	13	12	.0	165	44	2.2	6.7	211
Feb. 18	Feb. 27	75	69	.92	6.2	.15	.....	9.2	12	.0	79	34	6.9	1.4	129
Feb. 28	Mar. 9	240	213	.89	9.2	.9	.....	11	14	.0	118	51	6.4	1.8	187
Mar. 10	Mar. 19	170	109	.64	18	.05	35	11	18	.0	141	36	4.0	2.0	192
Mar. 20	Mar. 29	90	62	.69	......	.16	46	15	12	.0	195	38	1.3	3.3	231
Mar. 30	Apr. 8	285	140	.49	15	.45	44	16	9.5	.0	208	36	4.1	.....	221
Apr. 9	Apr. 18	50	30	.60	14	.10	59	21	12	.0	228	49	1.0	3.2	285
Apr. 19	Apr. 28	30	37	1.24	13	.03	61	23	15	.0	270	49	Tr.	4.2	319
Apr. 30	May 8	50	55	1.10	13	.40	46	18	15	.0	......	47	.6	5.4	284
May 9	May 18	50	....	......	9.8	.15	57	24	12	.0	270	38	Tr.	3.3	284
May 19	May 28	540	377	.70	36	1.4	48	14	11	.0	202	36	5.4	2.4	278
May 29	June 7	190	124	.65	17	.10	47	16	9.1	.0	181	37	2.9	3.2	232
June 8	June 16	650	476	.73	23	.40	38	13	11	.0	161	30	3.5	1.9	217
June 17	June 26	255	187	.68	25	.30	47	17	26	.0	......	32	3.4	4.3	270
June 27	July 7	350	214	.61	26	.30	55	20	11	.0	252	33	4.4	2.6	268
July 8	July 17	1,200	757	.63	25	.35	30	8.2	......	.0	114	40	3.0	.....	172
July 18	July 27	375	257	.67	22	.7	35	9.6	9.9	.0	153	22	7.2	.....	192
July 28	Aug. 7	162	117	.72	22	.06	55	16	15	.0	238	29	3.1	1.6	266
Aug. 8	Aug. 17	175	118	.67	20	.10	48	17	11	.0	218	32	3.9	2.4	249
Aug. 18	Aug. 27	75	50	.67	24	.19	59	18	8.9	.0	245	34	3.0	2.8	288
Aug. 28	Sept. 6	80	71	.89	16	.11	52	19	......	.0	222	33	3.0	4.2	243
Sept. 7	Sept. 16	50	63	1.26	17	.02	57	20	18	.0	267	38	.6	3.8	285
Mean		168	120	.80	19	.25	49	17	14	.0	210	36	2.8	3.6	247
Per ct. of anhydrous residue		......	....	......	7.8	[c].1	20.0	6.9	5.7	42.2	......	14.7	1.1	1.5	....

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[a] Analyses September 6, 1906, to February 17, 1907, by W. M. Barr; February 18 to 27, 1907, by Henry S. Spaulding; February 28 to September 16, 1907, by Walton Van Winkle.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from James River at Richmond, Va.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO$_2$).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO$_3$).	Bicarbonate radicle (HCO$_3$).	Sulphate radicle (SO$_4$).	Nitrate radicle (NO$_3$).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Sept. 10	Sept. 19	38	29	0.76	2.5	25	0.6	17	4.0	6.8	0.0	72	4.3	Tr.	2.4	100	0.7
Sept. 20	Sept. 29	43	15	.35	2.8	30	1.0	17	4.2	6.3	.0	76	5.1	0.4	2.2	119	.6
Sept. 30	Oct. 8	400	85	.21	21	54	1.3	17	3.2	4.7	.0	69	12	.4	Tr.	146	2.8
Oct. 10	Oct. 19	70	32	.46	3.5	15	.5	15	2.6	5.8	.0	58	5.1	.9	1.9	83	1.1
Oct. 20	Oct. 29	270	56	.21	7.1	21	.8	12	2.0	6.7	.0	....	3.9	.9	1.4	93	7.2
Oct. 30	Nov. 8	14	18	1.29	1.1	31	.3	15	3.6	6.9	.0	68	5.6	.7	2.9	98	1.0
Nov. 9	Nov. 18	12	12	1.00	0.5	25	.2	16	4.0	6.6	.0	71	10	.5	2.2	97	.6
Nov. 19	Nov. 28	260	227	.87	8.6	14	.9	11	1.4	4.6	.0	46	5 8	.4	1.4	71	2.1
Nov. 29	Dec. 8	14	11	.79	0.8	18	.3	13	2.4	3.9	.0	58	4.6	.2	.2	76	.7
Dec. 9	Dec. 18	11	7.4	.67	0.9	17	.25	14	4.2	3.0	.0	60	5.1	.1	2.2	79	.6
Dec. 19	Dec. 29	47	53	1.12	3.0	11	.4	13	3.0	1.8	.0	54	5.9	.2	2.2	71	1.3
Dec. 30	Jan. 8	55	59	1.07	5.8	16	.8	11	2.8	.....	.0	46	4.9	.7	1.9	71	1.5
Jan. 9	Jan. 19	9	20	2.23	1.3	15	.23	13	3.2	.....	.0	56	4.6	.4	1.9	73	1.1
Jan. 20	Jan. 29	21	44	2.10	2.3	12	.26	12	2.8	.....	.0	50	4.3	.5	1.8	63	1.2
Jan. 30	Feb. 8	6	10	1.67	0.8	14	.35	13	3.2	.....	.0	53	5.1	Tr.	2.4	70	1.0
Feb. 9	Feb. 18	24	18	.75	1.2	11	.6	13	3.4	3.6	.0	55	5.1	Tr.	3.0	69	1.0
Feb. 19	Mar. 1	17	15	.88	0.6	13	.18	13	2.0	4.7	.0	51	8.8	.9	1.7	70	1.0
Mar. 3	Mar. 12	55	47	.85	1.8	17	.67	12	2.3	6.1	.0	49	7.7	.7	1.0	76	1.4
Mar. 12	Mar. 22	55	50	.91	1.8	13	.23	12	2.5	6.1	.0	51	5.8	.6	1.0	69	1.8
Mar. 23	Apr. 2	38	25	.66	1.9	16	.19	14	2.5	6.8	.0	59	12	.3	1.4	83	.9
Apr. 3	Apr. 12	190	194	1.02	8.6	24	.7	13	1.8	11	.0	60	8.4	.0	2.6	97	3.5
Apr. 13	Apr. 22	42	64	1.52	2.1	26	.16	13	1.6	10	.0	59	5.6	.0	1.8	91	1.6
Apr. 23	May 3	80	70	.87	2.7	.....	.7	16	3.2	14	[b] 17	55	7.4	Tr.	3.4	174	1.3
May 4	May 13	220	190	.86	10	22	1.8	11	1.4	6.6	.0	52	6.6	.0	2.2	88	1.8
May 14	May 23	70	64	.91	2.6	24	.35	12	1.8	9.4	[b] 2.4	54	6.9	Tr.	1.8	91	1.2
May 24	June 2	110	125	1.14	5.6	20	.3	13	1.9	8.8	.0	62	7.2	Tr.	2.2	88	1.5
June 3	June 12	230	256	1.13	14	6.4	.5	9.6	0.6	6.9	[b] 2.4	33	7.7	.0	2.4	58	3.8
June 13	June 22	235	240	1.02	11	11	.3	12	0.4	7.2	[b] 11	27	6.1	.0	2.2	69	3.6
June 23	July 2	110	126	1.14	5.4	19	.24	15	0.6	9.8	[b] 12	46	6.2	Tr.	2.4	93	1.2
July 3	July 12	48	40	.83	1.2	11	.04	16	4.0	8.0	.0	62	7.6	.3	3.8	82	.6
July 13	July 22	20	29	1.45	0.6	17	.06	18	4.6	5.7	.0	71	8.4	.2	3.6	94	.6
July 23	Aug. 1	100	81	.81	1.4	14	.28	18	4.8	6.1	.0	67	11	Tr.	4.6	97	.4
Aug. 2	Aug. 11	45	36	.80	1.0	16	.05	18	4.8	7.2	.0	71	9.9	.4	3.6	98	.2
Aug. 12	Aug. 21	120	75	.62	1.6	18	1.5	17	5.2	6.9	.0	....	10	.7	3.6	100	.5
Aug. 22	Sept. 1	28	33	1.18	1.2	12	.19	19	5.5	5.0	[b] 3.6	67	10	.3	3.6	97	.3
Sept. 2	Sept. 9	150	90	.60	1.5	16	.79	19	5.1	6.0	.0	....	11	Tr.	3.2	100	.2
Mean		90	71	.96	3.9	18	.5	14	3.0	6.7	.0	60	7.1	.3	2.3	89	....
Per ct. of anhydrous residue		....	.....	......	.....	22.0	[c] .9	17.1	3.7	8.2	36.2	....	8.7	.4	2.8	....	....

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[a] Analyses September 10 to November 28, 1906, by R. B. Dole; November 29, 1906, to April 2, 1907, by R. B. Dole and M. G. Roberts; April 3 to July 2. 1907, by Chase Palmer and M. G. Roberts; July 12 to September 9, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO$_3$ in the average.

[c] Fe$_2$O$_3$.

Mineral analyses of water from Kalamazoo River near Kalamazoo, Mich.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—															
Sept. 19	Sept. 28	3	.....	......	0.3	29	0.3	59	20	9.0	6.8	250	16	1.5	3.8	272
Sept. 29	Oct. 8	4	.....	......	.3	19	.3	58	20	8.7	9.8	236	22	1.5	3.8	265
Oct. 9	Oct. 18	5	12	2.40	Tr.	20	Tr.	62	19	8.8	8.4	257	15	2.1	4.3	261
Oct. 19	Oct. 28	3	7.0	2.33	Tr.	20	Tr.	62	19	8.5	5.8	264	14	1.6	3.6	262
Oct. 29	Nov. 7	5	7.6	1.52	.1	16	Tr.	64	18	6.1	17	238	28	2.6	3.8	278
Nov. 8	Nov. 17	9	7.2	.80	Tr.	17	Tr.	63	18	6.5	.0	271	25	2.4	3.8	284
Nov. 18	Nov. 27	8	7.4	.92	.1	19	Tr.	66	19	8.3	.0	250	27	2.8	3.6	262
Nov. 27	Dec. 7	4	4.8	1.20	Tr.	21	Tr.	64	19	7.2	Tr.	253	21	2.8	3.4	267
Dec. 8	Dec. 18	7	3.2	.46	.1	15	.06	60	18	5.4	5.3	222	31	0.8	3.0	255
Dec. 19	Dec. 28	5	3.2	.64	.1	20	.07	68	21	5.8	17	234	31	3.2	3.6	289
Dec. 29	Jan. 1	6	5.6	.93	.3	17	.07	63	19	4.9	.0	252	24	3.2	3.4	262
Jan. 8	Jan. 17	11	13	1.18	.8	22	.06	56	17	3.3	.0	213	31	3.2	3.4	241
Jan. 18	Jan. 28	11	11	1.00	.6	11	.03	52	16	5.5	.0	198	28	3.2	3.0	223
Jan. 29	Feb. 8	9	54	6.00	.4	11	.05	49	19	7.1	19	202	32	1.9	3.5	228
Feb. 9	Feb. 18	19	89	4.68	.3	2.8	.06	31	19	8.4	14	160	25	.2	2.9	174
Feb. 19	Feb. 28	13	85	6.54	.2	3.4	.06	22	17	7.4	19	121	...	.0	3.1	140
Mar. 11	Mar. 20	4	7.0	1.75	.4	23	.06	57	17	6.9	14	220	23	3.6	3.0	252
Mar. 21	Mar. 27	9	15	1.67	.8	15	.05	52	14	6.3	4.8	193	22	2.0	2.4	223
Mar. 31	Apr. 9	9	16	1.78	.3	19	.06	52	14	11	14	173	26	2.0	3.6	235
Apr. 10	Apr. 21	10	25	2.50	.15	26	.06	..	16	......	17	160	24	3.5	4.6	232
Apr. 22	May 1	8	12	1.50	.3	24	.05	59	17	10	17	218	20	2.5	3.6	265
May 2	May 11	13	19	1.46	1.6	8.8	.05	49	15	6.9	12	163	30	2.5	3.4	214
May 12	May 21	2	3.5	1.75	.1	19	.07	60	18	12	12	234	22	1.8	3.4	263
May 22	June 1	4	6.5	1.62	.2	14	.06	58	18	10	12	235	20	1.5	2.8	252
June 2	June 11	6	9.5	1.58	.2	12	.03	58	18	11	11	228	20	2.5	3.0	249
June 12	June 22	3	6.5	2.17	.3	15	.05	58	19	13	Tr.	249	19	1.6	3.4	254
June 23	July 3	3	32	10.65	.6	16	.06	56	20	9.5	4.8	227	17	Tr.	4.2	241
July 4	July 13	10	95	9.50	Tr.	22	Tr.	37	20	......	.0	174	22	Tr.	2.6	189
July 14	July 23	7	36	5.14	Tr.	11	Tr.	37	19	......	9.6	135	20	Tr.	2.4	186
July 24	Aug. 2	4	11	2.75	Tr.	23	Tr.	58	20	......	12	202	20	.9	2.2	256
Aug. 3	Aug. 12	3	7.0	2.33	Tr.	14	Tr.	55	19	10	Tr.	228	20	1.5	4.5	233
Aug. 13	Aug. 22	3	8.4	2.80	Tr.	19	Tr.	38	21	......	.0	167	19	2.0	3.6	196
Aug. 23	Sept. 1	2	5.0	2.50	Tr.	23	Tr.	58	21	12	.0	251	21	1.5	3.4	254
Sept. 2	Sept. 11	3	5.4	1.80	Tr.	22	Tr.	58	21	......	.0	246	20	1.4	3.6	257
Sept. 12	Sept. 21	6	7.6	1.27	Tr.	18	Tr.	57	20	11	9.6	226	19	1.3	3.8	245
Mean............		7	19	2.64	.2	17	.05	55	18	8.2	7.8	216	23	1.9	3.4	242
Per ct. of anhydrous residue..		....	.....	......	.....	7.1	[b].0	22.9	7.5	3.4	47.3	.....	9.6	0.8	1.4	....

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[a] Analyses September 19 to December 7, 1906, by R. B. Dole; December 8, 1906, to March 27, 1907, by R. B. Dole and M. G. Roberts; March 31 to July 3, 1907, by Chase Palmer and M. G. Roberts; July 13 to September 21, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Kentucky River at Frankfort, Ky.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Aug. 28	Sept. 7	70	63	0.90	2.7	15	0.9	.....	2.2	11	0.0	77	5.4	Tr.	1.4	102	6.4
Sept. 8	Sept. 17	180	108	.60	4.0	28	1.2	18	4.2	8.9	.0	80	6.4	1.5	1.7	120	6.8
Sept. 18	Sept. 27	165	84	.51	5.2	23	1.4	21	2.6	7.2	.0	76	7.6	2.4	1.9	117	6.4
Sept. 28	Oct. 7	160	101	.63	4.9	21	.8	30	4.6	9.1	.0	111	8.2	2.6	1.7	147	7.3
Oct. 8	Oct. 18	105	73	.69	2.7	19	.6	27	4.8	6.5	.0	103	8.7	2.8	2.4	133	7.0
Oct. 19	Oct. 28	50	34	.68	2.0	5.2	.4	21	4.2	5.5	.0	83	7.6	1.7	2.2	105	6.0
Oct. 29	Nov. 8	43	25	.58	...	19	.3	22	4.6	6.8	.0	89	8.9	2.0	2.4	111	5.8
Nov. 9	Nov. 19	32	19	.59	.	14	.12	25	4.4	7.2	.0	90	7.9	2.1	2.2	112	5.8
Nov. 20	Nov. 30	..	406	.....	8.8	12	.7	26	4.0	6.5	.0	89	10	5.0	3.0	117	8.9
Dec. 1	Dec. 12	105	41	.39	1.9	15	.6	26	5.4	4.3	.0	80	....	6.2	....	117	6.2
Dec. 13	Dec. 23	450	430	.96	9.3	15	.65	27	4.8	3.6	.0	99	6.9	7.4	1.8	125	10.6
Dec. 24	Jan. 2	270	206	.76	5.8	18	1.4	25	4.6	3.0	.0	79	7.9	6.4	1.7	118	10.2
Jan. 3	Jan. 12	210	140	.67	3.2	14	.4	28	4.8	3.6	.0	94	9.4	7.4	1.4	121	9.5
Jan. 13	Jan. 22	700	660	.94	16	15	.7	26	5.2	5.2	.0	96	7.4	7.0	1.8	125	19.1
Jan. 23	Feb. 1	150	97	.65	4.2	14	.8	22	4.8	5.0	.0	...	8.1	5.0	1.2	95	9.6
Feb. 2	Feb. 11	65	124	1.91	3.5	13	.16	13	4.0	3.8	5.8	45	8.1	.4	1.4	73	8.4
Feb. 12	Feb. 21	36	58	1.61	1.9	9.8	.09	18	3.8	5.5	14	40	8.9	.9	2.4	83	8.0
Feb. 22	Mar. 3	200	273	1.36	10	4.0	.15	18	3.4	4.3	12	46	8.9	1.8	2.0	78	10.1
Mar. 4	Mar. 13	210	172	.82	5.8	12	.35	19	3.6	6.2	.0	74	8.7	4.1	1.6	96	10.4
Mar. 14	Mar. 23	650	632	.97	23	21	.4	18	3.4	6.5	.0	70	8.2	4.0	1.3	100	13.0
Mar. 24	Apr. 2	43	36	.84	1.4	11	.12	21	4.0	5.7	2.9	73	8.2	2.8	2.4	92	6.7
Apr. 3	Apr. 12	90	65	.72	2.1	15	.18	18	3.2	6.9	.0	63	8.4	2.2	2.5	88	8.0
Apr. 14	Apr. 23	26	24	.92	1.4	22	.21	13	1.3	8.7	2.4	49	6.2	1.5	2.6	86	7.3
Apr. 24	May 3	24	28	1.17	0.5	12	.06	14	1.4	6.4	.0	59	7.7	.3	2.2	86	6.8
May 4	May 13	90	137	1.52	3.0	18	.10	18	3.0	7.9	.0	89	4.0	.5	1.4	100	9.0
May 14	May 23	49	52	1.06	1.9	34	.6	20	2.4	9.1	.0	82	7.6	2.0	1.9	131	7.2
May 25	June 3	26	28	1.08	.8	15	.10	21	3.8	7.9	2.9	77	7.7	1.5	2.4	102	6.7
June 4	June 13	375	357	.95	13	22	1.3	13	1.7	9.1	.0	51	7.2	1.8	2.4	106	9.4
June 14	June 24	215	237	1.10	5.6	16	.61	14	1.3	9.9	.0	54	11	1.5	1.4	93	8.3
June 26	July 5	68	69	1.02	2.3	12	.11	16	3.8	6.1	8.4	49	7.1	Tr.	1.8	81	6.3
July 7	July 16	40	75	1.88	1.8	16	.05	17	4.8	9.1	12	46	12	Tr.	2.2	85	6.4
July 17	July 26	190	103	.54	3.8	28	.52	17	.....	9.9	8.4	58	12	.0	2.4	108	6.2
July 27	Aug. 5	33	53	1.60	1.4	7.8	.26	21	.....	6.6	17	41	9.9	.0	2.6	87	5.9
Aug. 6	Aug. 15	45	30	.67	2.1	16	.49	21	....	7.5	.0	72	9.1	1.3	.6	96	5.7
Aug. 16	Aug. 25	20	16	.80	1.0	16	.16	22	.....	8.3	.0	78	9.4	1.2	3.6	99	6.1
Aug. 26	Sept. 4	70	39	.56	2.4	22	.70	22	.....	7.2	.0	78	8.7	1.3	3.0	112	6.4
Mean		150	142	.93	4.7	16	.49	21	3.7	6.8	2.4	73	8.3	2.5	2.0	104	....
Per ct. of anhydrous residue..		....	....	.....	....	16.1	[b] .7	21.1	3.7	6.9	38.6	....	8.4	2.5	2.0	....	....

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[a] Analyses August 28, 1906, to January 22, 1907, by R. B. Dole; January 23 to April 2, 1907, by R. B. Dole and M. G. Roberts; April 3 to July 5, 1907, by Chase Palmer and M. G. Roberts; July 7 to September 4, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Lehigh River at South Bethlehem, Pa.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—																
Sept. 11	Sept. 20	8	7.4	0.92	1.5	11	0.10	22	8.0	6.8	0.0	58	43	2.0	7.0	128	4.2
Sept. 21	Sept. 30	7	6	.86	.6	13	.5	23	8.8	9.1	.0	65	44	1.9	8.2	145	4.2
Oct. 1	Oct. 10	12	11	.92	.5	11	.10	17	7.0	7.9	.0	48	42	3.0	5.5	119	4.4
Oct. 11	Oct. 21	8	7.8	.98	.9	11	.10	17	6.6	7.7	.0	49	38	3.2	6.0	113	4.5
Oct. 22	Oct. 31	13	20	1.54	1.7	9.0	.20	12	4.8	6.9	.0	30	26	1.9	3.8	79	5.1
Nov. 1	Nov. 11	12	12	1.00	1.4	5.4	.06	12	4.6	5.8	.0	28	29	2.8	4.7	78	4.9
Nov. 12	Nov. 21	16	18	1.12	1.6	6.4	.08	12	4.8	6.1	.0	25	32	2.8	5.3	84	4.9
Nov. 23	Dec. 3	10	10	1.00	.8	10	.07	12	4.8	8.5	.0	34	29	3.0	6.2	88	4.9
Dec. 4	Dec. 13	13	11	.85	1.4	5.6	.06	13	5.6	5.2	.0	28	31	3.0	4.6	78	....
Dec. 14	Dec. 23	11	10	.91	1.0	6.4	.07	11	4.8	4.1	.0	28	26	3.8	5.0	72	4.9
Dec. 24	Jan. 2	50	107	2.14	3.2	7.0	.12	10	.....	5.0	.0	28	25	4.0	5.4	68	....
Jan. 3	Jan. 13	17	34	2.00	1.9	8.0	.10	8.8	3.4	3.9	.0	22	20	4.0	3.8	60	5.4
Jan. 14	Jan. 25	13	22	1.69	1.8	9.6	.10	10	3.8	4.9	.0	27	21	4.0	3.7	68	5.2
Jan. 26	Feb. 4	11	11	1.00	1.1	7.2	.11	11	4.8	.....	.0	29	27	3.0	4.8	72	....
Feb. 6	Feb. 15	9	4.6	.51	1.0	9.2	.09	13	5.4	5.0	.0	40	28	3.0	4.6	84	....
Feb. 16	Feb. 25	6	10	1.66	.8	6.2	.06	15	5.0	5.0	.0	44	25	2.1	3.6	83	....
Feb. 26	Mar. 7	11	9.0	.82	1.0	8.4	.04	16	5.4	8.5	.0	49	30	6.9	4.2	100	....
Mar. 8	Mar. 17	55	103	1.88	2.8	7.2	.10	13	.....	4.5	.0	37	23	2.9	3.4	82	....
Mar. 18	Mar. 27	19	49	2.58	1.2	4.0	.09	7.6	1.6	5.8	.0	17	15	1.9	2.2	48	6.0
Mar. 28	Apr. 7	12	19	1.58	1.0	6.0	.09	11	2.2	4.6	.0	28	20	2.6	2.6	70	4.4
Apr. 8	Apr. 17	1	17	17.00	.9	4.6	.07	12	4.6	6.1	[c]9.6	17	23	.9	3.8	72	4.6
Apr. 18	Apr. 27	4	10	2.50	1.6	17	.10	13	5.0	.....	.0	34	26	1.0	3.6	92	4.7
Apr. 28	May 7	2	7.2	3.60	1.0	12	.08	14	4.8	8.2	.0	36	25	1.0	3.8	86	4.5
May 8	May 17	18	20	1.11	1.0	7.6	.09	13	6.7	11	[c]16	13	30	.0	4.4	98	4.5
May 18	May 27	1	7.0	7.00	.6	15	.05	14	4.8	8.7	.0	45	25	.5	3.8	95	4.5
May 28	June 6	...	16	......	1.4	5.6	.06	12	4.5	7.6	.0	23	31	1.3	3.8	77	4.7
June 7	June 15	1	5.4	5.40	.7	10	.07	11	4.2	5.7	.0	32	23	1.5	3.6	76	4.7
June 17	June 26	2	15	7.50	.5	8.8	.05	13	4.2	7.6	.0	37	29	Tr.	4.4	85	4.5
June 27	July 6	3	19	6.33	.4	3.0	.05	14	5.0	6.9	[c]11	11	34	.2	4.2	83	4.6
July 7	July 17	4	4.8	1.20	.6	7.8	.04	14	6.0	7.2	.0	27	37	2.1	4.2	94	4.5
July 18	July 27	42	34	.81	1.8	.....	.21	20	7.6	15	[c]4.8	57	37	1.8	5.8	174	4.3
July 28	Aug. 6	30	35	1.17	.9	.....	.03	15	7.0	11	[c]2.4	35	39	.0	5.8	123	4.2
Aug. 7	Aug. 17	5	5.2	1.04	.6	10	.04	21	9.6	.....	.0	56	38	1.8	7.0	127	4.3
Aug. 18	Aug. 27	4	4.8	1.20	.6	12	.13	24	10	12	.0	78	37	3.0	7.8	139	4.3
Aug. 28	Sept. 6	6	19	3.17	.8	15	.06	24	11	12	.0	78	37	2.2	8.4	147	4.2
Sept. 7	Sept. 16	...	......	......	1.8	.....	.06	.....	.....	.....	......	....	44	.....	6.0	....	4.5
Sept. 17	Sept. 26	40	39	.98	2.4	.....	.30	18	6.6	14	.0	66	31	.8	5.4	146	4.6
Mean		14	21	2.46	1.2	8.8	.10	14	5.7	7.5	.0	40	30	2.2	4.9	95	....
Per ct. of anhydrous residue		...	......	......	.....	9.5	[d].1	15.0	6.1	8.1	21.2	....	32.3	2.4	5.3	....	....

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[a] Analyses September 11 to October 31, 1906, by R. B. Dole; November 1, 1906, to April 7, 1907, by R. B. Dole and M. G. Roberts; April 8 to June 26, 1907, by Chase Palmer and M. G. Roberts; June 27, 1907, to September 26, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station at Mauch Chunk, Pa., 30 miles above.

[c] Abnormal; computed as HCO_3 in the average.

[d] Fe_2O_3.

Mineral analyses of water from Maumee River at Toledo, Ohio.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—															
Sept. 9	Sept. 18	55	46	0.84	2.0	28	0.10	58	17	44	0.0	178	44	2.2	91	397
Sept. 19	Sept. 29	70	55	.79	2.4	26	.20	57	16	40	.0	190	44	1.8	76	375
Sept. 30	Oct. 9	53	46	.87	2.4	19	.10	57	16	37	.0	192	43	1.8	71	350
Oct. 11	Oct. 20	37	30	.81	1.4	20	Tr.	67	19	36	.0	221	59	1.9	58	367
Oct. 21	Nov. 1	22	27	1.23	1.0	24	.04	66	22	40	.....	.....	68	1.7	79	416
Nov. 2	Nov. 11	16	14	.87	1.1	17	.03	73	23	49	5.8	208	71	2.1	106	442
Nov. 12	Nov. 23	80	84	1.05	2.2	14	.05	62	21	35	.....	.....	80	4.0	85	404
Nov. 24	Dec. 4	230	105	.46	3.5	16	.16	54	13	14	.0	157	48	19	23	275
Dec. 5	Dec. 15	290	590	2.04	6.6	23	.4	53	13	14	.0	159	47	13	24	277
Dec. 16	Dec. 26	210	112	.53	3.9	27	.3	57	14	18	5.8	160	51	12	24	296
Jan. 6	Jan. 15	350	235	.67	8.0	18	.7	42	8.2	10	.0	134	33	11	12	214
Jan. 16	Jan. 26	375	230	.61	11	17	1.1	37	.....	10	.0	123	29	9.0	12	193
Jan. 27	Feb. 7	55	43	.78	2.1	7.2	1.5	48	12	11	Tr.	151	37	4.5	14	262
Feb. 8	Feb. 18	20	22	1.10	.9	14	.13	77	18	22	5.5	228	69	8.5	38	372
Feb. 19	Feb. 28	12	9.2	.77	.6	15	.03	80	22	29	.0	242	74	6.0	58	410
Mar. 1	Mar. 10	37	29	.78	1.1	11	.04	70	19	25	.0	216	67	6.4	52	356
Mar. 11	Mar. 23	900	402	.45	16	36	.7	44	12	21	6.0	128	40	8.0	26	266
Mar. 24	Apr. 2	730	423	.58	15	5.0	.20	42	11	14	.0	131	41	6.4	13	222
Apr. 3	Apr. 12	98	133	1.36	3.3	6.0	.10	43	12	15	12	102	43	4.8	28	216
Apr. 13	Apr. 23	27	28	1.04	1.2	24	.08	72	18	20	11	210	57	6.0	30	344
Apr. 24	May 3	37	38	1.03	1.3	20	.06	74	20	25	9.6	214	63	3.0	44	373
May 4	May 14	9	13	1.45	.3	13	.03	64	18	25	9.6	178	59	2.5	46	326
May 15	May 23	42	58	1.38	1.0	9.8	.10	60	23	28	8.4	172	58	.3	44	320
May 25	June 3	20	47	2.35	.6	4.8	.08	.....	12	26	Tr.	93	50	.2	42	202
June 4	June 13	175	175	1.00	4.0	18	.18	.....	10	15	8.4	95	34	4.0	19	180
June 15	June 24	250	254	1.02	6.3	18	.18	.....	11	16	Tr.	120	34	Tr.	16	187
June 25	July 2	120	133	1.11	2.2	3.8	.16	.....	12	16	.....	.....	30	2.0	14	162
July 5	July 16	....	.....	.....	1.9	.....	.12	35	16	26	Tr.	134	44	Tr.	35	232
July 17	July 26	270	195	.72	6.7	24	.6	52	13	24	.0	181	34	5.5	29	283
July 27	Aug. 5	63	61	.97	2.5	19	.7	44	9.0	14	.0	157	22	4.0	12	212
Aug. 6	Aug. 15	40	32	.80	1.2	18	.14	56	12	19	Tr.	199	33	2.2	23	267
Aug. 16	Aug. 26	40	32	.80	1.1	12	.11	64	16	21	.0	228	47	1.6	26	309
Aug. 27	Sept. 7	38	30	.79	1.5	14	.16	63	17	22	.0	224	50	2.2	26	310
Sept. 8	Sept. 17	38	30	.79	.7	22	.08	62	18	29	.0	229	53	1.0	34	339
Sept. 18	Sept. 27	125	122	.98	2.5	18	.6	52	16	23	.0	187	44	1.8	31	289
Sept. 28	Oct. 7	90	44	.49	1.6	22	.5	53	14	27	.0	177	42	2.0	41	292
Mean		143	112		3.4	17	.27	57	16	24	2.5	173	48	4.5	40	298
Per ct. of anhydrous residue		....	.....	.95	.....	5.8	[b] .1	19.4	5.4	8.2	29.7	.....	16.3	1.5	13.6	....

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[a] Analyses September 9, 1906, to March 10, 1907, by R. B. Dole and M. G. Roberts; March 11 to October 7, 1907, by Chase Palmer and M. G. Roberts.

[b] Fe_2O_3.

Mineral analyses of water from Miami River at Dayton, Ohio.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO$_2$).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO$_3$).	Bicarbonate radicle (HCO$_3$).	Sulphate radicle (SO$_4$).	Nitrate radicle (NO$_3$).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
Sept. 16	Sept. 25	32	75	2.34	3.1	16	Tr.	58	28	10	9.0	264	38	0.9	5.0	300	0.7
Sept. 26	Oct. 5	32	58	1.81	.9	21	Tr.	65	28	9.0	9.0	280	35	2.8	5.8	318	.8
Oct. 6	Oct. 15	18	32	1.78	.4	17	Tr.	63	26	9.6	.0	297	37	3.1	5.0	309	.6
Oct. 16	Oct. 25	14	26	1.86	.10	18	Tr.	65	27	9.0	.0	301	40	2.9	5.0	317	.8
Oct. 26	Nov. 4	5	14	2.80	.15	20	Tr.	66	28	11	8.2	291	41	2.0	5.5	327	1.0
Nov. 5	Nov. 14	8	20	2.50	Tr.	20	Tr.	69	29	9.8	Tr.	317	41	2.0	5.3	335	2.0
Nov. 15	Nov. 24	75	89	1.19	2.1	14	0.24	64	27	9.8	11	250	49	7.0	4.3	304	2.8
Nov. 25	Dec. 4	16	21	1.31	.5	19	.05	75	28	7.4	3.6	278	69	15	4.0	346	2.4
Dec. 5	Dec. 14	26	34	1.31	.7	26	.07	75	28	8.2	10	269	62	12	4.7	355	2.5
Dec. 15	Dec. 24	80	54	.67	1.4	15	.23	64	23	6.8	.0	239	52	13	3.0	296	3.0
Dec. 25	Jan. 4	....	177	.....	3.2	16	.19	68	24	7.1	.0	272	52	12	3.5	318	4.2
Jan. 5	Jan. 14	210	118	.56	3.0	14	.5	50	17	6.5	.0	184	36	18	3.6	238	6.5
Jan. 15	Jan. 24	450	223	.50	6.7	15	.7	42	14	7.1	.0	161	29	11	3.4	212	7.5
Jan. 25	Feb. 4	75	49	.65	1.8	16	.6	61	23	8.8	12	229	44	16	4.1	301	3.3
Feb. 5	Feb. 14	45	42	.93	.5	8.8	.05	60	26	8.0	12	215	51	10	3.8	282	2.9
Feb. 15	Feb. 24	11	28	2.55	.4	24	.06	58	25	6.9	13	212	42	11	4.1	298	2.8
Feb. 25	Mar. 6	260	143	.55	4.2	25	.08	67	25	7.4	8.4	246	49	9.0	3.8	320	2.9
Mar. 27	Apr. 6	37	52	1.41	1.0	15	.12	64	24	8.0	12	228	44	10.0	4.6	299	2.2
Apr. 7	Apr. 16	25	67	2.68	.3	20	.14	50	26	8.4	12	200	44	15	5.4	282	2.1
Apr. 17	Apr. 26	25	32	1.28	.6	19	.11	58	25	3.5	16	217	41	15	4.2	298	2.2
Apr. 27	May 6	20	36	1.80	.4	15	.16	62	24	6.3	13	229	39	19	3.8	297	2.5
May 7	May 16	18	35	1.94	.4	23	.11	58	23	3.3	14	217	40	18	4.3	292	2.0
May 17	May 28	37	79	2.14	1.3	14	.10	52	26	3.0	12	218	41	15	3.8	275	1.8
May 29	June 8	240	186	.77	4.4	19	.19	53	20	12	10	197	34	15	4.8	264	3.8
June 9	June 18	280	252	.90	7.0	18	.7	49	18	11	9.6	180	27	17	3.8	252	5.2
June 19	June 28	75	75	1.00	2.6	17	.12	60	22	11	2.4	249	33	6.2	4.8	283	2.5
June 29	July 8	90	168	1.86	1.6	17	.03	42	26	8.2	.0	206	37	1.2	4.2	240	1.9
July 9	July 19	....	351	.....	7.9	30	.35	51	20	14	.0	.....	26	6.4	2.4	254	4.0
July 20	July 29	....	234	.....	3.2	8.6	.04	26	18	12	.0	.....	32	Tr.	.6	163	3.4
July 30	Aug. 8	....	125	.....	1.6	9.2	Tr.	56	24	12	.0	.....	37	1.5	.6	258	2.2
Aug. 9	Aug. 18	....	77	.....	1.0	18	.03	55	25	11	.0	.....	39	1.5	1.4	273	1.4
Aug. 19	Aug. 28	35	48	1.37	.9	9.8	.05	69	29	12	.0	323	34	.0	5.4	331	1.1
Aug. 29	Sept. 7	43	46	1.07	.9	15	.04	63	24	14	.0	287	41	2.5	5.8	304	1.2
Sept. 8	Sept. 17	140	130	.93	2.6	19	.13	59	25	13	.0	251	36	2.2	4.8	289	1.7
Mean		84	94	1.46	2.0	17	.15	59	24	9.0	5.8	244	40	8.6	4.1	289	....
Per ct. of anhydrous residue		....	....	.....	......	5.9	[b] .1	20.5	8.3	3.1	43.8	.....	13.9	3.0	1.4	....	....

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[a] Analyses September 9 to December 4, 1906, by R. B. Dole; December 5, 1906, to March 6, 1907, by R. B. Dole and M. G. Roberts; March 27 to June 28, 1907, by Chase Palmer and M. G. Roberts; June 29 to September 17, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Lake Michigan at St. Ignace, Mich.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).	Turbidity.	Suspended matter.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Sept. 20	1	....	17	0.02	27	7.7	4.9	5.9	109	6.6	0.20	2.6	123	581.08
Oct. 20	1	....	9.2	.02	26	7.4	4.4	6.6	103	6.5	.30	2.6	115	580.85
Nov. 20	Tr.	....	9.5	.05	28	8.8	3.4	2.4	117	6.4	.35	2.9	120	580.72
Dec. 20	1	....	10	.06	25	7.1	4.7	1.6	104	6.2	Tr.	2.6	108	580.62
Jan. 20	1	....	6.2	.04	26	8.1	3.2	1.6	110	6.2	.4	2.8	110	580.67
Feb. 19	....	....	12	.03	26	8.4	5.4	3.4	113	7.6	.35	2.8	120	580.64
Mar. 20	....	....	14	.03	25	7.9	5.0	Tr.	111	7.9	.4	2.6	117	580.67
Apr. 21	....	....	8.4	.04	26	8.1	4.7	.0	112	9.5	.3	2.4	115	580.83
May 20	....	....	9.5	.03	27	8.7	5.4	2.6	115	7.8	.25	2.5	121	581.07
June 20	....	....	8.6	.04	26	8.4	6.6	4.5	116	7.7	.55	3.0	120	581.42
Aug. 20	....	....	11	.04	28	9.4	4.2	3.5	120	7.4	.4	3.2	123	581.51
Mean	Tr.	Tr.	10	.04	26	8.2	4.7	2.9	112	7.2	0.3	2.7	118	....
Per ct. of anhydrous residue	....	....	8.5	[c].0	22.2	7.0	4.0	49.6	......	6.1	0.3	2.3	.....	....

[a] Analyses by R. B. Dole and M. G. Roberts.

[b] Gaging station at Mackinaw, Mich., 5 miles away.

[c] Fe_2O_3.

Mineral analyses of water from Minnesota River at Shakopee, Minn.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—															
Sept. 24	Oct. 4	110	124	1.13	28	0.05	68	33	20	0.0	270	123	1.8	3.5	419	6.6
Oct. 6	Oct. 18	75	83	1.11	28	Tr.	77	40	21	[c]9.6	317	126	1.8	4.2	469	4.6
Oct. 19	Oct. 30	60	61	1.02	24	.10	82	.....	33	.0	331	134	1.3	6.5	477	4.6
Oct. 31	Nov. 10	80	110	1.38	29	Tr.	84	38	27	.0	287	184	1.5	3.5	536	6.4
Nov. 12	Nov. 22	70	74	1.06	29	.05	86	37	25	.0	329	171	.9	4.1	533	5.7
Nov. 23	Dec. 4	70	76	1.08	20	.05	97	39	32	.0	366	182	.9	4.5	580	4.7
Dec. 5	Jan. 1	20	20	1.00	24	Tr.	116	.....	33	.0	444	215	2.6	7.5	696	4.6
Jan. 2	Jan. 12	10	8.0	.80	22	.05	150	58	.....	.0	459	206	1.4	8.7	688	3.4
Jan. 14	Jan. 24	10	4.0	.40	26	Tr.	121	55	30	.0	.....	205	1.4	11	692	3.2
Jan. 25	Feb. 6	5	....	......	24	Tr.	126	57	.....	.0	489	211	1.3	......	722	2.8
Feb. 7	Feb. 21	10	....	......	28	Tr.	102	48	39	.0	415	177	5.5	10	609	3.8
Feb. 22	Mar. 5	10	12	1.20	16	Tr.	59	26	22	.0	201	94	2.8	4.8	337	6.0
Mar. 6	Mar. 16	10	....	......	18	.03	69	22	20	.0	222	118	2.3	1.4	384	4.6
Mar. 19	Mar. 29	275	422	1.54	19	.40	43	19	15	.0	154	66	1.9	2.0	250	7.8
Mar. 30	Apr. 10	110	142	1.29	13	.18	45	19	14	.0	178	82	1.8	2.0	288	9.4
Apr. 11	Apr. 21	.....	132	......	11	.15	50	25	23	.0	212	107	1.3	......	359	7.6
Apr. 22	Apr. 30	50	....	......	22	Tr.	72	33	22	.0	266	128	7.8	2.9	439	5.7
May 3	May 14	30	....	......	14	.01	99	42	26	.0	294	180	Tr.	3.7	527	5.3
May 15	May 25	30	....	......	16	.05	94	43	20	.0	320	203	1.8	3.4	588	4.9
May 28	June 6	80	112	1.40	20	.18	91	40	18	.0	284	177	1.9	2.5	553	6.3
June 7	June 18	175	288	1.64	26	.20	78	34	17	.0	261	153	1.6	1.7	482	9.8
June 19	June 29	105	158	1.50	30	.10	77	32	19	.0	278	137	1.2	......	447	13.1
July 1	July 12	80	144	1.80	27	.08	78	37	21	.0	310	140	3.4	3.6	477	8.7
July 13	July 24	330	371	1.12	28	.15	71	31	27	.0	287	114	2.7	7.4	419	7.2
July 25	Aug. 5	155	236	1.52	27	.03	71	31	11	.0	279	112	2.2	......	408	6.3
Aug. 7	Aug. 17	155	180	1.16	30	.05	82	37	27	.0	334	133	1.5	5.8	481	3.8
Aug. 19	Aug. 29	240	256	1.08	25	.04	66	30	21	.0	271	106	1.6	5.0	408	3.8
Aug. 30	Sept. 9	140	....	......	.....	.05	66	29	15	.0	236	126	.4	1.9	397	4.2
Sept. 10	Sept. 20	140	113	.81	32	.04	77	32	19	[c]6.0	272	112	1.4	8.2	437	3.0
Sept. 21	Oct. 1	165	141	.85	23	.6	58	19	.....	.0	200	94	1.5	3.0	312	4.0
Mean............		97	142	1.18	23	.09	82	35	23	.0	296	144	2.0	4.7	480	....
Per ct. of anhydrous residue..		.....	....	......	5.0	[d].0	17.9	7.6	5.0	31.7	.....	31.4	.4	1.0	.....	....

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[a] Analyses September 24, 1906, to February 6, 1907, by W. M. Barr; February 7 to March 5, 1907, by H. S. Spaulding; March 6 to September 9, 1907. by Walton Van Winkle; September 10 to October 1, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station at Mankato, Minn., 60 miles above.

[c] Abnormal; computed as HCO_3 in the average.

[d] Fe_2O_3.

Mineral analyses of water from Mississippi River at Minneapolis, Minn.[a]

[Parts per million, unless otherwise stated.]

Date (1906–7). From—	Date (1906–7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3)	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Sept. 10	Sept. 19	25	19	0.76	33	0.10	.....	13	15	0.0	204	8.2	0.8	0.9	225	1.7
Sept. 20	Sept. 30	10	33	3.30	30	.10	40	15	14	.0	182	20	.9	2.5	209	2.5
Oct. 1	Oct. 10	15	29	1.93	19	.10	38	......	15	.0	.....	14	5.2	3.8	194	3.0
Oct. 11	Oct. 21	10	13	1.30	22	.05	41	16	10	.0	196	25	.4	2.5	191	2.0
Oct. 22	Oct. 31	10	7.4	.74	21	Tr.	42	15	9.2	.0	189	27	.3	2.0	203	2.2
Nov. 1	Nov. 10	15	13	.87	13	Tr.	38	16	11	.0	.....	18	Tr.	1.0	187	2.8
Nov. 11	Nov. 21	10	10	1.00	12	.05	43	16	11	.0	.....	20	.7	1.6	206	2.6
Nov. 22	Dec. 1	5	6.0	1.20	12	.08	46	15	9.9	.0	215	25	.9	2.0	220	4.7
Dec. 2	Dec. 12	10	6.4	.64	13	.10	46	16	7.6	.0	218	23	1.8	1.9	220	9.6
Dec. 13	Dec. 24	5	Tr.	......	16	.06	47	17	9.8	.0	214	28	.9	1.7	236	....
Dec. 25	Jan. 4	5	Tr.	......	17	Tr.	47	......	13	.0	208	20	.9	1.5	217	....
Jan. 5	Jan. 15	5	Tr.	......	15	Tr.	41	14	7.5	.0	222	......	1.3	1.7	213	....
Jan. 16	Jan. 26	10	2.4	.24	14	.06	46	16	11	.0	222	18	1.1	2.0	206	....
Jan. 27	Feb. 6	5	Tr.	......	16	.10	45	18	8.2	.0	222	......	1.6	1.9	217	....
Feb. 7	Feb. 16	5	Tr.	......	13	.10	.....	16	12	.0	220	12	2.0	1.9	214	....
Feb. 17	Feb. 26	5	4.0	.80	16	.05	46	14	16	.0	205	24	7.0	2.3	221	....
Feb. 27	Mar. 8	5	2.4	.48	17	.05	43	16	17	.0	222	23	4.6	1.5	218	....
Mar. 9	Mar. 18	10	......	......	11	.....	46	......	9.8	.0	195	15	2.9	2.0	207	....
Mar. 19	Mar. 28	15	29	1.93	12	.05	.....	......	9.6	.0	147	9.2	1.9	2.2	155	....
Mar. 30	Apr. 8	30	30	1.00	9.0	.25	27	8.8	6.5	.0	127	17	1.2	.3	132	6.2
Apr. 9	Apr. 19	10	Tr.	......	9.0	.01	26	9.8	7.3	.0	127	20	1.1	.4	160	4.5
Apr. 20	Apr. 29	5	Tr.	......	15	.15	34	12	8.0	.0	144	20	Tr.	1.5	183	3.1
Apr. 30	May 13	5	Tr.	......	12	.04	33	13	7.0	.0	156	20	1.9	.....	180	2.3
May 14	May 23	7	......	......	15	.02	39	13	......	.0	178	18	.6	.2	209	1.7
May 24	June 2	5	Tr.	......	12	.05	35	12	7.9	.0	165	22	.8	.....	205	2.9
June 3	June 13	8	......	......	14	Tr.	.....	12	5.2	.0	159	19	1.2	.6	180	3.3
June 14	June 23	5	Tr.	......	12	.15	37	13	5.7	.0	171	23	1.3	3.3	233	4.0
June 24	July 3	20	......	......	18	Tr.	41	15	6.4	.0	193	16	1.1	1.2	221	2.6
July 4	July 13	20	24	1.20	20	.05	44	......	11	.0	.....	15	1.6	3.1	206	1.3
July 14	July 23	5	Tr.	......	8.6	.08	44	10	13	.0	198	8.6	.6	Tr.	198	1.0
July 24	Aug. 2	10	......	......	5.2	.13	43	11	12	.0	206	14	1.1	1.0	197	.8
Aug. 3	Aug. 12	5	Tr.	......	13	.11	40	14	11	.0	199	14	T.	1.4	187	.7
Aug. 13	Aug. 22	10	7.6	.76	17	.10	38	14	7.5	.0	173	13	.4	.4	185	1.1
Aug. 23	Sept. 1	5	Tr.	......	19	.18	35	12	9.0	.0	172	10	.4	1.5	175	1.4
Sept. 2	Sept. 11	5	Tr.	......	15	.11	37	12	11	.0	185	14	Tr.	.5	173	.6
Mean		10	7.9	1.13	15	.07	40	14	10	.0	188	18	1.4	1.6	200	....
Per ct. of anhydrous residue		....	......	......	7.8	[c].1	20.8	7.3	5.2	48.0	.....	9.3	.7	.8	.....	....

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[a] Analyses September 10, 1906, to February 16, 1907, by W. M. Barr; February 17 to 26, 1907, by H. S. Spaulding; February 27 to September 11, 1907, by Walton Van Winkle.

[b] Gaging station at Anoka, Minn., 20 miles above.

[c] Fe_2O_3.

Mineral analyses of water from Mississippi River at Memphis, Tenn.[a]

[Parts per million, unless otherwise stated.]

Date (1907-8).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Jan. 10	Jan. 20	420	353	0.84	......	40	0.7	....	14	....	0.0	146	....	0.3	6.0	198	32.8
Jan. 21	Jan. 30	350	239	.68	......	39	.7	32	17	....	.0	129	....	.5	7.0	209	34.9
Jan. 31	Feb. 9	340	264	.78	......	34	.20	....	......	....	.0	82	....	.4	7.0	168	39.5
Feb. 10	Feb. 19	270	216	.80	......	37	.7	29	9.0	....	.0	90	....	.5	5.5	165	28.7
Feb. 20	Mar. 1	420	324	.77	......	36	1.2	32	18	....	.0	112	....	.6	7.0	186	18.0
Mar. 2	Mar. 11	425	355	.84	......	34	.8	43	17	....	.0	112	....	.5	10	205	25.8
Mar. 12	Mar. 21	680	615	.90	......	43	.7	....	12	....	.0	102	....	.3	9.5	172	29.7
Mar. 22	Mar. 31	550	505	.92	......	40	.7	....	10	....	.0	90	....	.9	9.5	162	34.2
Apr. 1	Apr. 10	960	740	.77	......	34	1.3	37	12	....	.0	115	....	.2	12	188	32.9
Apr. 11	Apr. 20	680	485	.71	......	22	1.3	27	11	....	.0	115	....	1.6	6.5	156	23.6
Apr. 21	Apr. 30	550	415	.76	......	24	1,4	29	8.4	....	.0	104	....	1.8	8.0	161	21.5
May 1	May 10	1,150	816	.71	......	31	2.8	24	15	....	.0	95	....	1.1	9.0	174	24.7
May 11	May 20	375	386	1.03	......	31	1.6	26	9.7	13	.0	95	36	2.9	5.0	188	30.8
May 21	May 30	485	484	1.00	......	19	1.1	30	7.7	13	.0	93	36	5.5	5.1	169	25.8
May 31	June 9	420	332	.79	......	10	.12	....	12	13	.0	122	46	5.3	6.3	188	19.2
June 11	June 20	1,600	1,421	.89	......	19	.05	42	12	....	.0	153	63	4.9	5.9	247	27.3
June 21	June 30	1,300	1,161	.89	......	12	1.6	36	14	....	.0	....	53	4.9	5.5	231	28.2
July 1	July 10	1,400	1,244	.89	......	16	.18	46	11	28	.0	156	56	5.3	8.7	245	21.9
July 11	July 20	1,000	1,185	1.18	......	13	.30	49	15	21	.0	....	67	2.2	6.0	246	17.8
July 21	July 30	425	1,389	3.26	......	14	.11	41	12	28	.0	172	67	2.4	12	250	22.9
July 31	Aug. 9	900	797	.89	......	16	.08	37	9.3	24	.0	143	41	1.8	9.0	205	22.9
Aug. 10	Aug. 19	950	888	.93	......	21	.20	39	12	21	.0	144	52	4.0	6.8	220	17.0
Aug. 20	Aug. 29	600	......	......	......	22	.13	41	13	21	.0	149	47	4.6	8.0	236	14.8
Aug. 30	Sept. 8	600	451	.75	......	17	.17	36	12	22	.0	144	40	1.7	8.5	207	14.1
Sept. 9	Sept. 18	280	307	1.10	10	22	.16	38	12	17	[b]8.4	130	33	1.2	8.4	204	11.8
Sept. 19	Sept. 28	270	316	1.17	10	24	.14	34	12	13	[b]7.2	146	34	Tr.	11	218	10.1
Sept. 29	Oct. 8	220	203	.92	7.4	23	.22	39	10	20	[b]7.2	145	37	Tr.	9.8	219	10.0
Oct. 9	Oct. 18	240	221	.92	8.8	14	.5	35	10	16	Tr.[b]	142	34	Tr.	9.4	198	10.9
Oct. 19	Oct. 28	270	198	.73	11	21	.37	36	13	17	[b]7.2	134	34	.20	9.6	208	9.9
Oct. 29	Nov. 9	240	316	1.32	8.8	20	.12	43	13	18	[b]3.6	159	40	Tr.	11	235	7.0
Nov. 10	Nov. 19	230	203	.88	7.9	21	.52	42	13	28	[b]7.2	159	39	Tr.	14	257	9.0
Nov. 20	Dec. 1	230	215	.93	13	10	.42	36	11	18	Tr.[b]	127	43	Tr.	16	200	12.0
Dec. 2	Dec. 12	180	187	1.04	8.0	5.6	.07	33	10	14	[b]8.4	106	29	Tr.	9.0	162	11.6
Dec. 13	Dec. 22	170	160	.94	3.5	24	.24	36	12	17	[b]13	115	32	1.7	9.6	201	8.4
Dec. 23	Jan. 1	265	265	1.00	7.9	26	.56	33	10	16	Tr.[b]	124	35	1.5	9.6	195	13.5
Mean		556	519	.97	......	24	.61	36	12	19	.0	129	43	1.7	8.6	202	.....
Per ct. of anhydrous residue		......	......	......	......	11.5	[c].4	17.3	5.7	9.1	30.5	....	20.6	.8	4.1	....	.....

[a] Analyses January 10 to May 10, 1907, by Jas. R. Evans; May 11 to September 8, 1907, by Walton Van Winkle; September 9, 1907, to January 1, 1908, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Mississippi River at New Orleans, La.[a]

[Parts per million, unless otherwise stated.]

Date (1905-6).		Silica (SiO_2).	Iron (Fe).	Aluminum (Al).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).[b]	Chlorine (Cl).	Total dissolved solids.	Free carbon dioxide (CO_2).	Mean gage height (feet).[b]
From—	To—														
Apr. 29	May 6	9.5	0.11	0.63	29	7.5	12	......	98	22	2.1	9.2	145	13	10.5
May 7	May 13	8.2	.12	.44	28	6.7	13	......	100	23	2.1	11	150	25	10.6
May 14	May 20	8.6	.10	.72	32	7.9	14	......	100	27	2.1	10	157	15	11.9
May 21	May 27	8.8	.25	.42	30	7.1	19	......	103	23	2.1	11	158	38	12.3
May 28	June 3	8.8	.10	.54	33	7.7	19	......	110	25	2.1	8.3	166	22	13.2
June 4	June 10	11	.06	.59	31	7.1	14	......	105	24	2.1	7.5	156	16	13.9
June 11	June 17	12	.10	.72	33	7.3	12	......	115	23	2.0	7.3	157	8.0	13.7
June 18	June 24	14	.12	.76	34	8.1	14	......	122	24	2.0	9.8	176	15	12.3
June 25	July 1	14	.06	.67	35	8.9	14	......	125	25	2.0	9.4	178	44	10.9
July 2	July 8	11	.11	.34	35	9.0	15	......	125	30	2.8	9.9	185	9	10.7
July 9	July 15	11	.13	.30	34	8.5	18	......	116	36	2.8	7.7	182	47	11.5
July 16	July 22	10	.12	.20	33	8.1	18	......	110	35	2.7	12	183	30	11.9
July 23	July 29	12	.11	.29	32	7.7	15	......	108	28	2.6	7.6	168	3	11.4
July 30	Aug. 5	13	.13	.32	33	8.5	21	......	116	36	2.7	10	195	47	11.2
Aug. 6	Aug. 12	15	.15	.27	32	7.8	16	......	111	29	2.3	10	180	32	10.3
Aug. 13	Aug. 20	11	.27	.40	32	8.0	19	......	115	27	2.3	11	179	15	9.1
Aug. 21	Aug. 26	12	.26	.23	32	8.2	14	......	115	24	2.4	8.0	169	17	7.4
Aug 27	Sept. 2	11	.30	.28	33	8.7	17	......	122	26	2.5	13	185	20	7.4
Sept. 3	Sept. 9	11	.21	.24	33	9.0	21	......	120	29	2.4	17	199	62	7.3
Sept. 10	Sept. 16	10	.10	.43	32	8.8	16	......	118	26	2.3	10	18[illegible]	20	4.8
Sept. 17	Sept. 23	13	.15	.53	34	9.1	15	......	126	24	2.5	10	195	51	3.2
Sept. 24	Sept. 30	16	.21	.93	39	10	21	......	132	30	2.4	18	210	21	4.8
Oct. 1	Oct. 7	16	.10	.43	33	8.9	17	......	117	27	2.6	12	190	13	7.6
Oct. 8	Oct. 14	10	.09	.33	30	6.8	13	......	106	18	2.3	7.8	157	22	5.4
Oct. 15	Oct. 21	12	.08	.55	33	8.7	14	......	118	20	2.3	8.8	170	20	2.8
Oct. 22	Oct. 28	12	.09	.36	39	11	15	......	140	23	2.2	11	192	10	1.9
Oct. 29	Nov. 4	13	.10	.27	42	12	15	......	151	25	3.0	11	210	19	3.5
Nov. 5	Nov. 11	9.3	.09	.41	34	10	14	......	123	22	2.8	11	168	31	5.2
Nov. 12	Nov. 18	10	.08	.41	32	9.0	11	......	115	21	3.2	9.4	158	30	5.1
Nov. 19	Nov. 25	9.6	.11	.29	35	10	12	......	117	23	3.0	11	169	39	4.7
Nov. 26	Dec. 2	11	.08	.42	33	9.5	13	......	126	25	2.8	11	18[illegible]	23	3.5
Dec. 3	Dec. 9	12	.11	.37	39	12	16	......	142	24	2.8	15	207	23	2.8
Dec. 10	Dec. 16	9.4	.15	.18	42	12	16	......	145	29	2.7	14	215	24	5.7
Dec. 17	Dec. 23	8.0	.13	.28	33	9.1	11	......	115	22	3.0	9.5	172	33	8.4
Dec. 24	Dec. 30	6.8	.13	.32	29	7.6	11	......	94	20	2.8	11	149	39	7.5
Jan. 1	Jan. 6	9.2	.12	.47	31	7.8	11	......	98	20	2.3	11	150	18	8.0
Jan. 7	Jan. 13	9.2	.10	.38	31	8.0	9.4	......	100	18	2.5	8.2	148	26	8.9
Jan. 14	Jan. 20	7.6	.09	.25	32	8.0	11	......	102	23	2.7	11	157	28	10.5
Jan. 21	Jan. 27	9.2	.11	.37	28	6.7	8.3	......	92	19	2.6	6.5	136	46	10.7
Jan. 28	Feb. 3	9.2	.12	.33	29	7.0	8.5	......	91	18	2.7	8.2	138	44	11.4
Feb. 4	Feb. 10	7.8	.10	.29	28	6.8	7.8	......	91	17	2.5	6.3	130	50	12.5
Feb. 11	Feb. 17	9.8	.11	.34	27	6.6	7.8	......	85	18	2.3	6.8	13[illegible]	37	12.4
Feb. 18	Feb. 24	11	.10	.27	28	7.0	8.4	......	91	18	2.2	7.0	139	35	10.3
Feb. 25	Mar. 3	9.2	.10	.32	30	8.1	9.7	......	105	18	2.2	8.0	150	31	7.3
Mar. 4	Mar. 10	13	.12	.44	35	10	11	......	125	21	2.7	10	168	33	7.1
Mar. 11	Mar. 17	10	.10	.35	35	10	10	......	116	26	2.8	8.7	165	48	9.8
Mar. 18	Mar. 24	12	.18	.50	30	8.0	9.6	......	96	22	2.9	8.4	144	44	11.6
Mar. 25	Mar. 31	11	.15	.42	31	8.0	9.4	......	98	21	2.8	7.3	145	45	8.0
Apr. 1	Apr. 7	9.2	.15	.37	30	7.8	9.5	......	98	20	2.9	9.0	142	42	12.5
Apr. 8	Apr. 14	9.3	.14	.29	29	7.2	7.9	......	91	18	2.1	5.3	132	52	13.4
Apr. 15	Apr. 21	8.0	.13	.35	27	7.0	8.3	......	92	17	3.0	4.8	130	41	14.2
Apr. 22	Apr. 28	11	.13	.24	29	7.2	9.9	......	92	20	2.5	6.1	137	45	15.5
Mean		11	c.13	c.40	32	8.4	13	.0	111	24	2.5	9.7	166	.....	.....
Per ct. of anhydrous residue		7.1	c.1	c.5	20.6	5.4	8.4	34.7	......	15.4	1.6	6.2	.....	.....	.....

[a] Analyses by J. S. Porter, chemist, New Orleans water and sewerage board.
[b] Gaging station at Carrollton, La., 5 miles above.
[c] $Fe_2O_3+Al_2O_3$.

Mineral analyses of water from Missouri River near Florence, Nebr.[a]

[Parts per million, unless otherwise stated.]

Date (1906–7.)		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—															
Oct. 1	Oct. 10	2,400	2,776	1.16	30	0.20	53	17	57	0.0	.....	197	1.3	8.0	442	7.1
Oct. 11	Oct. 20	1,080	911	.84	18	.05	88	37	34	.0	215	178	.9	8.7	467	6.2
Oct. 21	Oct. 31	880	1,303	1.48	44	.6	68	25	72	.0	.....	175	.3	9.0	496	6.7
Nov. 1	Nov. 10	1,470	1,495	1.02	36	.5	73	25	53	.0	231	184	1.0	8.7	526	6.4
Nov. 11	Nov. 20	625	730	1.17	27	.5	82	30	57	.0	247	195	.9	9.1	543	5.8
Nov. 21	Nov. 30	350	460	1.32	29	.20	94	30	45	.0	298	212	1.8	9.5	597	5.1
Dec. 2	Dec. 13	325	352	1.08	24	.18	92	38	51	.0	305	211	.9	12	565	4.7
Dec. 14	Dec. 23	80	80	1.00	25	.10	102	38	58	.0	337	237	1.0	12	663	3.7
Dec. 25	Jan. 3	90	80	.89	23	.05	91	33	52	.0	300	222	.9	14	608	....
Jan. 4	Jan. 13	120	140	1.17	23	.05	82	30	.....	.0	270	199	.9	14	545	....
Jan. 15	Jan. 26	230	220	.96	28	.10	97	27	60	.0	309	233	1.4	15	615	....
Jan. 27	Feb. 6	40	68	1.70	34	Tr.	96	32	60	.0	310	224	1.6	15	620	....
Feb. 7	Feb. 16	110	83	.75	27	.15	80	27	50	.0	251	178	1.5	12	499	....
Feb. 17	Feb. 27	1,400	2,691	1.92	36	1.2	50	13	38	.0	154	132	1.6	6.2	340	....
Feb. 28	Mar. 12	750	1,520	2.03	37	1.4	56	13	38	.0	156	143	2.6	5.5	403	10.4
Mar. 14	Mar. 23	2,700	2,854	1.06	39	2.0	51	18	38	.0	156	144	2.9	8.7	393	12.6
Mar. 24	Apr. 2	2,700	2,968	1.10	16	1.0	45	10	62	.0	160	153	1.2	10	394	12.0
Apr. 3	Apr. 12	3,330	3,511	1.06	43	.7	54	15	49	.0	176	128	1.2	7.1	402	12.2
Apr. 14	Apr. 23	3,600	4,071	1.13	55	1.2	61	.....	58	.0	162	204	1.5	6.9	540	12.8
Apr. 25	May 4	3,800	4,026	1.06	67	.65	53	.....	56	.0	152	217	1.2	6.0	548	11.5
May 5	May 14	3,100	2,514	.81	21	.35	52	17	50	.0	163	154	3.6	6.9	390	11.0
May 15	May 24	1,460	1,624	1.11	41	.8	56	18	43	.0	177	167	1.1	8.2	435	10.3
May 25	June 3	7,200	7,726	1.08	16	.10	58	16	56	.0	164	197	1.7	4.6	455	14.0
June 4	June 13	4,000	5,900	1.47	10	.18	58	16	56	.0	164	190	3.8	6.2	444	14.8
June 14	June 24	2,800	4,286	1.53	76	1.2	59	.....	50	.0	162	180	3.8	6.1	530	15.9
June 25	July 4	3,200	3,203	1.00	21	.07	61	12	40	.0	166	.....	1.8	5.0	.....	15.8
July 5	July 14	4,000	5,554	1.39	20	.9	51	16	51	.0	152	179	3.1	.....	416	16.6
July 15	July 24	3,600	2,977	.83	16	.13	50	12	44	.0	161	113	5.0	7.0	325	16.9
July 25	Aug. 3	1,600	1,816	1.14	19	.04	49	7.9	50	.0	171	108	5.5	7.6	340	15.2
Aug. 4	Aug. 13	2,000	1,989	.99	21	.05	47	14	44	.0	163	110	2.0	14	326	13.3
Aug. 14	Aug. 23	1,000	1,180	1.18	26	.04	66	20	37	.0	262	81	1.6	6.0	353	11.9
Aug. 24	Sept. 3	900	1,580	1.75	25	.38	46	14	36	.0	146	96	.9	8.8	300	10.6
Sept. 4	Sept. 13	1,200	968	.81	33	.06	48	13	42	.0	158	115	.9	7.0	322	9.7
Sept. 14	Sept. 23	1,000	847	.85	36	.10	48	13	40	[c]4.8	146	113	.7	8.4	332	9.2
Sept. 24	Oct. 3	900	812	1.16	35	.35	54	17	44	[c]7.2	150	.....	Tr.	7.8	362	8.8
Oct. 4	Oct. 14	1,000	797	.80	33	.14	54	14	46	[c]4.8	161	134	1.2	9.6	373	8.5
Mean		1,726	2,059	1.16	31	.44	65	20	49	.0	203	168	1.8	8.9	454	....
Per ct. of anhydrous residue		......	......	......	7.0	[d].2	14.6	4.5	11.0	22.5	.....	37.8	.4	2.0	.....	....

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[a] Analyses October 1, 1906, to February 6, 1907, by W. M. Barr; February 17 to 27, 1907, by H. S. Spaulding; February 28 to September 13, 1907, by Walton Van Winkle; September 14 to October 14, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station near Omaha, Nebr., 5 miles below.

[c] Abnormal; computed as HCO_3 in the average.

[d] Fe_2O_3.

Mineral analyses of water from Missouri River near Kansas City, Kans.[a]

[Parts per million, unless otherwise stated.]

Date. (1906-7.)		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—															
Oct. 4	Oct. 13	2,500	2,231	0.89	31	0.30	60	19	49	0.0	198	138	2.2	13	419	8.5
Oct. 14	Oct. 23	900	942	1.05	26	Tr.	69	21	40	.0	215	154	.4	13	438	7.2
Oct. 24	Nov. 2	1,230	1,680	1.36	33	.5	64	21	.....	.0	217	128	2.2	15	426	8.7
Nov. 3	Nov. 12	1,500	1,470	.98	31	.40	69	22	49	.0	219	150	2.2	13	447	9.0
Nov. 13	Nov. 22	870	840	.97	38	.40	75	24	50	.0	236	164	.9	13	486	8.6
Nov. 23	Dec. 2	475	577	1.21	30	.20	77	22	53	.0	270	158	.4	15	495	7.6
Dec. 3	Dec. 12	500	547	1.09	38	.40	77	21	.....	.0	275	146	1.8	17	510	7.0
Dec. 13	Dec. 22	300	319	1.06	30	.40	85	27	51	.0	307	175	.9	20	525	4.5
Dec. 23	Jan. 2	190	222	1.17	41	.12	91	29	55	.0	334	.....	1.3	22	580	4.5
Jan. 3	Jan. 12	350	374	1.07	39	.40	78	26	49	.0	265	158	2.6	18	503	7.4
Jan. 13	Jan. 22	270	247	.91	35	.35	79	23	52	.0	265	159	3.1	18	493	6.3
Jan. 23	Feb. 2	140	96	.69	41	.08	90	30	55	.0	326	176	2.2	23	579	5.1
Feb. 3	Feb. 12	35	24	.68	43	.20	84	28	68	.0	328	167	2.2	24	590	5.2
Feb. 13	Feb. 22	1,020	1,316	1.29	70	2.8	61	22	61	.0	.....	.....	4.4	16	454	10.2
Feb. 23	Mar. 5	1,400	1,730	1.24	74	.20	56	17	43	.0	156	.....	1.7	8.5	414	13.5
Mar. 6	Mar. 15	1,500	1,896	1.26	41	1.4	52	15	37	.0	164	122	3.4	9.5	392	12.0
Mar. 16	Mar. 25	3,450	2,867	.83	65	2.1	.....	....	39	.0	164	123	1.9	11	435	13.5
Mar. 26	Apr. 4	2,150	2,619	1.22	55	2.1	.....	10	41	.0	157	.....	2.5	6.3	362	12.7
Apr. 5	Apr. 14	2,800	2,826	1.01	62	2.4	53	15	42	.0	168	137	2.2	8.7	440	13.1
Apr. 15	Apr. 24	3,600	3,496	.97	41	.5	68	11	55	.0	162	179	3.0	9.5	462	13.2
Apr. 25	May 4	3,800	3,938	1.04	89	1.8	.....	20	60	.0	.....	171	Tr.	11	549	12.0
May 5	May 14	2,800	2,350	.84	47	3.2	.....	16	48	.0	160	176	5.3	11	478	11.3
May 15	May 24	1,200	1,952	1.62	49	1.2	58	....	43	.0	176	.....	3.5	12	394	10.1
May 25	June 3	3,850	4,204	1.10	43	1.1	.....	17	46	.0	171	170	3.9	14	460	13.0
June 4	June 13	5,350	6,611	1.24	20	1.0	53	14	52	.0	161	168	.7	8.5	424	17.7
June 14	June 23	3,200	4,719	1.48	26	.10	56	14	56	.0	157	168	2.6	8.4	418	17.8
June 24	July 4	4,000	3,982	1.00	25	1.2	57	....	45	.0	178	131	3.5	8.8	406	18.6
July 5	July 14	4,400	4,676	1.06	22	.05	53	10	46	.0	159	143	3.7	8.3	383	19.8
July 15	July 24	3,600	3,147	.87	24	.48	47	13	38	.0	157	103	4.1	6.7	316	22.6
July 25	Aug. 3	2,000	3,458	1.73	15	Tr.	46	....	37	.0	183	101	3.4	6.0	323	19.1
Aug. 4	Aug. 13	2,700	3,013	1.12	22	.30	44	12	29	.0	.....	99	3.0	5.5	295	16.5
Aug. 14	Aug. 23	2,400	2,651	1.12	21	.28	44	14	.....	.0	136	95	.9	7.0	291	13.8
Aug. 24	Sept. 2	2,000	1,677	.84	18	.05	45	14	.....	.0	152	92	1.3	......	293	11.1
Sept. 3	Sept. 12	1,700	1,376	.81	20	.03	45	12	31	.0	155	87	1.6	11	307	9.9
Sept. 13	Sept. 22	1,200	878	.73	27	.33	53	10	38	.0	171	105	1.8	13	337	8.5
Sept. 23	Oct. 2	1,075	791	.74	27	.26	53	12	36	.0	167	108	1.6	13	339	8.3
Oct. 4	Oct. 13	1,100	792	.72	26	1.0	53	11	43	[c]Tr.	171	110	1.5	17	349	8.6
Oct. 14	Oct. 21	1,000	668	.67	28	.28	56	9.8	45	[c]Tr.	180	120	1.3	16	389	7.6
Mean............		1,909	2,032	1.04	37	.73	62	18	44	.0	202	135	2.2	13	426	.....
Per ct. of anhydrous residue..		....	....	......	9.0	[d].2	15.0	4.4	10.7	24.2	.....	32.8	.5	3.2	.....	.....

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[a] Analyses October 4, 1906, to February 12, 1907, by W. M. Barr; February 13 to 22, 1907, by H. S. Spaulding; February 23 to September 12, 1907, by Walton Van Winkle; September 13 to October 21, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Sampling station above the entrance of Kansas River; gaging station below that stream.

[c] Abnormal; computed as HCO_3 in the average.

[d] Fe_2O_3.

Mineral analyses of water from Missouri River near Ruegg, Mo.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—															
Sept. 27	Oct. 7	1,800	1,784	0.99	29	Tr.	41	12	31	0.0	134	82	.....	14	291	10.3
Oct. 8	Oct. 17	1,900	1,461	.77	29	0.20	54	13	38	.0	195	.....	2.0	12	363	7.6
Oct. 19	Oct. 28	930	972	1.04	46	.10	66	19	55	.0	232	134	1.3	18	445	6.6
Oct. 29	Nov. 7	1,150	1,210	1.05	23	.20	67	22	.....	.0	225	126	1.3	21	424	7.7
Nov. 8	Nov. 17	1,650	1,208	.73	21	.25	68	22	53	.0	.....	133	2.4	15	442	7.6
Nov. 18	Nov. 27	780	885	1.14	24	.20	69	19	42	.0	226	126	1.8	16	421	7.6
Nov. 29	Dec. 9	500	527	1.06	28	.5	56	29	31	.0	227	104	.9	16	383	7.7
Dec. 10	Dec. 20	425	464	1.09	29	.30	69	24	35	.0	245	103	2.2	18	429	7.3
Dec. 21	Dec. 31	300	327	1.09	27	.30	70	26	40	.0	288	114	2.6	.....	438	5.2
Jan. 1	Jan. 10	375	296	.79	25	.40	.....	24	36	.0	268	100	2.2	21	420	6.9
Jan. 11	Jan. 20	550	427	.78	31	.80	54	19	31	.0	188	92	3.2	14	342	10.6
Jan. 21	Jan. 30	1,400	1,566	1.12	.....	.....	31	11	28	.0	.....	.....	4.1	10	262	14.6
Jan. 31	Feb. 9	350	326	.93	49	1.4	40	14	21	.0	127	.....	3.0	8.4	274	8.1
Feb. 10	Feb. 19	400	436	1.09	22	.45	67	20	31	.0	.....	128	4.0	18	378	7.6
Feb. 20	Mar. 1	1,400	1,894	1.35	30	.45	58	16	35	.0	184	97	4.5	14	348	11.0
Mar. 2	Mar. 11	1,000	1,626	1.62	14	.22	48	15	32	.0	159	94	3.7	12	292	10.4
Mar. 12	Mar. 21	2,000	2,016	1.01	41	1.7	50	11	27	.0	164	88	4.1	11	319	12.9
Mar. 23	Apr. 2	1,970	2,435	1.24	27	.7	42	13	39	.0	.....	112	1.1	14	345	11.2
Apr. 3	Apr. 12	2,600	2,389	.92	56	1.8	50	14	34	.0	149	96	3.4	8.9	350	11.2
Apr. 13	Apr. 22	4,000	3,249	.81	46	1.0	51	15	45	.0	173	125	5.0	10	401	11.1
Apr. 23	May 3	3,200	3,070	.96	47	1.6	51	16	38	.0	151	146	2.0	9.3	413	11.7
May 4	May 13	2,300	2,320	1.01	48	1.6	46	15	28	.0	144	102	3.6	7.6	342	13.4
May 14	May 23	1,500	2,270	1.52	33	1.2	39	10	18	.0	130	68	4.1	6.7	271	14.1
May 24	June 4	2,800	2,369	.84	17	.20	.....	14	36	.0	185	98	3.0	11	317	10.4
June 5	June 15	4,800	6,332	1.33	28	.20	52	15	39	.0	160	142	6.6	9.2	385	15.9
June 16	June 25	4,250	1,251	.29	16	.10	55	8.4	44	.0	151	135	2.7	6.9	354	15.6
June 26	July 5	3,600	4,002	1.11	18	.40	54	8.6	36	.0	149	95	5.0	6.3	306	17.4
July 6	July 16	3,600	3,937	1.10	23	.....	45	.....	37	.0	159	.....	1.9	7.0	333	15.8
July 17	July 26	4,000	4,429	1.12	16	.25	49	12	.....	.0	176	77	5.5	5.5	315	18.6
July 27	Aug. 6	3,300	2,460	.74	18	.19	43	.....	38	.0	144	87	2.7	6.0	282	16.0
Aug. 7	Aug. 17	3,900	3,346	.86	20	.10	40	12	40	.0	141	90	2.7	7.3	285	13.2
Aug. 18	Aug. 27	2,600	2,500	.96	17	.01	39	12	31	.0	141	80	2.2	7.3	254	11.5
Aug. 28	Sept. 6	1,000	1,321	1.32	19	.14	46	14	32	.0	153	85	1.1	10	277	9.1
Sept. 7	Sept. 16	1,280	1,050	.82	28	.06	46	12	38	c4.8	156	84	1.3	14	300	8.0
Sept. 17	Sept. 26	1,000	994	.99	28	.19	50	14	38	c4.8	167	88	1.5	14	319	7.0
Sept. 27	Oct. 6	900	889	.99	36	.06	53	14	37	c9.6	173	9[illegible]	1.4	17	351	6.8
Mean............		1,931	1,890	1.02	29	.51	52	16	36	.0	178	10[illegible]	2.9	12	346	.....
Per ct. of anhydrous residue..		....	....	.....	8.5	d.2	15.3	4.7	10.6	25	.....	30.[illegible]	.8	3.5	....	.....

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[a] Analyses September 27, 1906, to February 19, 1907, by W. M. Barr; February 20 to March 1, 1907, by H. S. Spaulding; March 2 to September 6, 1907, by Walton Van Winkle; September 7 to September 16, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station at Hermann, Mo., 70 miles above.

[c] Abnormal; computed as HCO_3 in the average.

[d] Fe_2O_3.

Mineral analyses of water from Monongahela River at Elizabeth, Pa.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Aug. 25	Sept. 3	42	50	1.19	2.7	13	1.0	12	2.2	9.6	0.0	23	34	0.7	2.8	94	8.60
Sept. 4	Sept. 13	34	26	.76	2.0	7.4	.5	15	2.4	9.4	.0	22	45	.6	3.5	97	7.02
Sept. 14	Sept. 23	9	16	1.78	.1	7.2	Tr.	16	4.0	11	.0	8.7	61	1.2	4.7	118	7.36
Sept. 24	Oct. 3	10	9	.90	1.1	6.2	.4	16	4.2	12	.0	4.8	64	.6	4.8	121	7.75
Oct. 4	Oct. 13	18	25	1.39	3.1	4.8	1.1	12	2.8	6.2	.0	16	40	.5	3.8	94	8.13
Oct. 14	Oct. 23	29	25	.86	3.4	9.6	.9	12	2.0	6.3	.0	17	32	1.5	3.4	83	9.06
Oct. 24	Nov. 2	31	34	1.10	2.3	7.4	.9	10	3.0	6.3	.0	21	28	1.2	3.0	74	7.91
Nov. 3	Nov. 12	42	27	.64	3.3	5.4	.7	13	2.6	7.2	.0	12	40	1.8	3.4	82	7.06
Nov. 13	Nov. 22	85	94	1.10	6.3	5.2	.4	15	2.8	7.9	.0	9.8	42	1.6	4.1	90	7.46
Nov. 23	Dec. 2	75	54	.72	3.0	7.6	.8	10	1.4	5.8	.0	20	21	2.6	2.6	66	8.37
Dec. 3	Dec. 12	60	81	1.35	3.7	5.6	.5	10	3.6	6.0	.0	15	28	1.0	3.5	69	11.02
Dec. 13	Dec. 21	....	183	.....	5.6	6.2	.56	8.6	2.4	4.6	.0	15	19	1.5	1.9	56	14.56
Dec. 22	Jan. 2	47	54	1.15	2.5	5.6	.25	10	3.0	5.4	.0	15	27	1.5	2.9	63	12.40
Jan. 3	Jan. 12	80	93	1.16	3.5	4.4	.5	9.8	3.0	4.6	.0	15	24	1.5	2.4	64	13.25
Jan. 13	Jan. 22	350	362	1.03	17	8.2	.7	8.0	.....	4.9	.0	22	18	2.5	3.4	77	24.96
Jan. 23	Feb. 1	21	24	1.14	1.8	6.0	.07	12	3.6	6.5	.0	9.8	44	1.7	2.4	80	9.14
Feb. 2	Feb. 11	110	106	.96	6.1	5.4	.19	11	.6	5.5	.0	12	32	2.5	1.7	64	12.44
Feb. 12	Feb. 21	27	39	1.45	2.8	5.8	.12	13	2.0	6.5	.0	17	37	2.1	2.9	73	10.18
Feb. 22	Mar. 3	28	35	1.25	2.3	5.6	.25	10	1.4	5.5	.0	15	32	2.1	2.9	66	10.42
Mar. 4	Mar. 13	190	123	.65	4.4	6.0	.26	9.6	.4	5.2	.0	18	22	1.9	1.7	54	13.12
Mar. 14	Mar. 24	350	362	1.03	7.5	18	1.0	11	.6	8.5	.0	19	26	2.0	2.9	83	20.00
Mar. 25	Apr. 3	50	47	.94	2.5	5.4	.1	14	3.2	6.6	.0	16	44	Tr.	2.6	85	8.22
Apr. 4	Apr. 13	12	28	2.33	1.6	7.8	.06	18	3.0	12	.0	11	65	2.5	4.2	119	7.28
Apr. 14	Apr. 23	45	61	1.36	2.8	8.8	.46	11	1.8	6.3	.0	16	33	2.8	3.5	78	10.04
Apr. 24	May 3	65	83	1.28	2.6	8.8	.9	8.8	1.0	5.5	.0	18	20	3.0	2.9	63	11.15
May 4	May 13	45	66	1.47	2.1	17	.46	11	1.0	6.8	.0	23	25	1.8	3.0	80	10.82
May 14	May 23	37	49	1.32	2.5	18	.33	11	1.0	9.6	.0	23	27	1.5	3.4	81	9.43
May 24	June 2	40	52	1.30	2.1	12	.95	13	1.2	9.4	.0	22	32	1.8	2.9	87	8.05
June 3	June 12	45	61	1.36	1.9	7.4	.21	11	.8	7.2	.0	22	26	1.5	3.9	70	11.19
June 13	June 22	180	140	.78	4.0	11	.28	17	1.8	8.5	.0	50	24	3.0	3.6	96	11.50
June 23	July 3	38	36	.95	2.3	2.2	.05	14	2.4	5.2	.0	20	37	Tr.	3.6	79	7.50
July 4	July 13	70	66	.93	3.2	11	.28	12	2.0	8.5	.0	21	34	2.7	3.8	90	9.14
July 14	July 23	285	280	.98	13	14	1.4	8.2	1.0	6.6	.0	21	15	2.8	2.2	76	14.53
July 24	Aug. 1	205	158	.77	5.3	9.8	.46	11	1.8	.....	.0	......	22	2.5	2.6	72	11.23
Aug. 3	Aug. 12	39	40	1.02	2.6	10	.28	13	2.8	7.7	.0	17	37	2.0	3.4	85	7.90
Aug. 13	Aug. 22	70	76	1.08	1.9	7.0	.35	13	2.8	9.3	.0	13	38	3.5	4.8	86	6.85
Aug. 23	Sept. 2	90	41	.45	3.5	8.4	.6	12	2.2	.....	.0	32	28	1.0	4.6	82	9.40
Mean............		82	84	1.11	3.7	8.4	.49	12	2.2	7.3	.0	18	33	1.8	3.2	81	......
Per ct. of anhydrous residue..		....	....	......	.....	10.8	[c].9	15.5	2.8	9.4	11.5	......	42.6	2.3	4.2	....	......

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[a] Analyses August 25 to October 23, 1906, and from November 3 to December 2, 1906, by R. B. Dole; October 24 to November 2, 1906, and from December 3, 1906, to April 3, 1907, by R. B. Dole and M. G. Roberts; April 4 to September 2, 1907, by Chase Palmer and M. G. Roberts.

[b] Gaging station at Lock No. 4, 10 miles above.

[c] Fe_2O_3.

Mineral analyses of water from Muskingum River at Zanesville, Ohio.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Sept. 3	Sept. 13	130	78	0.60	3.5	15	0.10	47	10	27	0.0	136	40	0.2	60	281	8.1
Sept. 14	Sept. 23	100	26	.26	2.9	23	.30	55	12	27	.0	155	41	.9	71	314	7.8
Sept. 24	Oct. 3	70	53	.76	2.2	32	Tr.	58	13	36	.0	154	52	.0	.....	356	8.1
Oct. 4	Oct. 13	85	62	.73	2.9	15	Tr.	55	11	46	.0	.....	53	2.1	.....	339	9.0
Oct. 14	Oct. 23	48	41	.85	2.6	13	Tr.	52	12	.....	.0	132	51	1.9	65	334	8.8
Oct. 24	Nov. 2	45	45	1.00	1.4	27	.06	53	11	33	5.3	136	50	1.0	62	305	8.6
Nov. 3	Nov. 13	24	17	.71	0.7	14	.03	60	13	36	Tr.	160	49	1.0	77	326	8.2
Nov. 14	Nov. 24	80	58	.74	1.8	12	.06	55	11	33	Tr.	168	50	1.1	.....	301	10.2
Nov. 25	Dec. 4	32	30	.94	1.4	11	.16	41	9.8	19	Tr.	111	43	3.0	38	216	9.5
Dec. 5	Dec. 15	150	111	.72	5.6	15	.23	37	8.4	20	3.6	96	40	4.5	.....	207	11.3
Dec. 16	Dec. 27	....	95	.....	3.9	10	.19	35	8.4	14	.0	92	38	3.6	29	182	11.4
Dec. 28	Jan. 4	....	87	.....	7.2	7.6	.14	32	6.0	12	.0	86	.....	3.8	28	169	13.6
Jan. 10	Jan. 20	....	121	.....	11	13	.75	22	3.6	7.1	.0	61	.....	4.2	13	128	18.6
Jan. 21	Mar. 4	85	71	.84	3.2	11	.19	37	7.6	12	4.8	89	.....	3.7	29	192	11.7
Mar. 9	Mar. 31	480	56	.12	....	18	.20	28	......	14	17	36	35	2.1	19	160	17.0
Apr. 6	Apr. 20	17	31	1.82	1.7	9.0	.11	44	9.8	22	.0	117	45	1.5	36	225	10.3
Apr. 21	Apr. 30	215	152	.71	5.8	25	.25	36	7.0	19	.0	93	39	1.6	29	207	13.5
May 1	May 10	42	40	.95	1.8	15	.23	38	8.4	17	.0	102	40	1.5	28	197	11.1
May 11	June 1	81	129	1.59	2.3	16	.09	26	8.8	21	.0	76	42	.0	36	187	11.3
June 2	June 18	105	94	.90	4.0	12	.18	26	7.6	17	.....	.....	35	1.5	24	181	11.8
June 19	July 4	3	52	17.33	1.0	.....	.5	30	9.6	24	2.4	70	42	.0	46	188	8.9
July 5	July 20	110	100	.91	4.0	12	.18	42	9.2	19	.0	127	38	1.2	38	227	9.5
July 21	July 31	260	225	.87	7.7	10	.4	28	5.8	14	.0	83	26	.8	20	150	12.6
Aug. 2	Aug. 11	62	28	.45	1.1	11	.10	46	9.0	21	.0	130	36	.8	37	223	8.8
Aug. 12	Aug. 21	2	11	5.50	0.3	11	.06	58	12	31	Tr.	160	45	.4	65	296	8.0
Aug. 22	Aug. 31	48	43	.90	1.4	7.6	.13	58	12	38	Tr.	145	50	.5	.....	328	8.1
Sept. 1	Sept. 10	35	30	.86	1.0	11	.16	64	12	.....	Tr.	156	51	.4	.....	373	7.8
Mean		96	70	1.71	3.2	14	.18	43	9.5	23	1.3	115	43	1.6	40	244	.....
Per ct. of anhydrous residue		....	....	.....	....	6.0	[b].1	18.5	4.1	9.9	25.0	.....	18.5	0.7	17.2	.....	.....

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[a] Analyses September 3 to October 23, 1906, by R. B. Dole; October 21 to March 31, 1907, by R. B. Dole and M. G. Roberts; April 6 to September 10, 1907, by Chase Palmer and M. G. Roberts.

[b] Fe_2O_3.

Mineral analyses of water from Neuse River at Raleigh, N. C.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
Oct. 1	Oct. 10	14	13	0.93	0.9	25	0.4	5.2	1.8	7.1	0.0	.....	2.6	0.0	3.8	68
Oct. 11	Oct. 20	14	11	.78	.5	27	.4	5.6	1.2	7.2	.0	39	1.0	Tr.	3.8	66
Oct. 21	Oct. 30	24	18	.75	.8	25	.4	6.0	1.2	7.9	.0	44	1.2	.0	4.6	68
Nov. 1	Nov. 10	10	5.8	.58	.8	20	.4	7.2	1.8	8.2	.0	39	3.0	.2	5.0	69
Nov. 11	Nov. 20	11	7.6	.69	.9	21	.3	5.4	1.6	7.7	.0	37	2.8	.2	4.6	63
Nov. 21	Nov. 30	9	5.8	.64	.5	21	.3	6.0	2.0	8.2	.0	40	2.8	Tr.	5.2	65
Dec. 1	Dec. 10	11	3.8	.34	.4	22	.3	5.6	1.8	8.0	.0	41	2.8	.0	4.8	65
Dec. 11	Dec. 20	26	16	.61	1.4	22	.65	6.4	1.6	8.0	.0	37	2.1	Tr.	5.8	68
Dec. 21	Dec. 30	45	29	.64	2.1	22	1.8	6.0	2.4	6.5	.0	32	2.3	Tr.	6.5	74
Dec. 31	Jan. 9	17	9.0	.53	1.3	21	.9	5.6	1.6	6.8	.0	35	1.8	Tr.	6.5	68
Jan. 10	Jan. 19	11	6.8	.62	1.0	22	.8	6.8	2.8	7.9	.0	39	3.5	Tr.	5.9	66
Jan. 20	Jan. 29	8	3.4	.42	.9	21	.6	6.4	2.6	7.8	.0	40	2.8	Tr.	5.9	65
Jan. 30	Feb. 8	15	10	.67	1.3	20	.8	6.2	2.6	6.3	.0	37	2.8	Tr.	.....	67
Feb. 9	Feb. 18	29	18	.62	1.5	22	1.4	5.8	1.8	6.0	.0	36	3.1	Tr.	.....	72
Feb. 19	Feb. 28	.....	72	.....	3.9	22	1.7	5.6	1.4	6.0	.0	23	4.9	.7	4.7	79
Mar. 1	Mar. 10	33	12	.36	2.1	22	2.0	5.0	1.2	7.6	.0	25	3.3	.5	4.1	76
Mar. 12	Mar. 21	.....	77	.....	2.8	26	2.6	4.8	1.2	6.9	.0	23	4.6	.6	3.5	85
Mar. 22	Mar. 31	18	20	1.11	1.0	22	.6	6.0	1.8	6.8	[b]2.4	28	2.0	.0	3.8	63
Apr. 1	Apr. 10	48	45	.94	1.8	16	1.3	5.8	1.6	8.2	.0	33	4.1	.5	5.0	62
Apr. 11	Apr. 21	27	19	.70	1.3	39	1.2	6.8	1.8	8.8	.0	40	3.6	.5	5.4	93
Apr. 22	May 2	81	73	.90	2.7	23	2.0	6.4	1.7	8.8	.0	32	4.8	1.0	4.2	77
May 3	May 12	82	67	.82	2.4	28	2.1	6.0	1.4	9.3	.0	32	3.5	.7	4.6	82
May 13	May 22	28	39	1.40	1.3	30	.95	6.2	1.8	11	[b]4.8	29	2.8	Tr.	4.2	78
May 23	June 1	53	57	1.08	1.8	22	.9	6.4	1.8	......	.0	35	3.3	.9	3.8	66
June 3	June 12	100	96	.96	1.8	32	1.7	5.4	.8	10	.0	34	4.4	.0	3.6	90
June 13	June 22	325	247	.76	7.4	24	2.0	5.6	.8	8.2	.0	28	4.3	1.2	3.0	79
June 23	July 2	325	280	.86	13	39	3.7	8.2	2.0	12	.0	50	3.6	Tr.	4.6	.....
July 3	July 12	48	50	1.04	1.6	24	.9	6.6	.....	9.1	.0	37	3.5	.0	3.6	71
July 13	July 23	160	333	2.08	1.9	24	1.8	4.8	.....	8.5	.0	35	3.3	Tr.	3.0	74
July 24	Aug. 1	120	82	.68	1.6	24	1.5	6.4	3.0	6.3	.0	37	3.9	.8	3.2	75
Aug. 3	Aug. 12	540	428	.79	7.0	43	5.2	3.8	1.9	5.4	.0	18	7.6	.6	3.8	.....
Aug. 13	Aug. 22	70	26	.37	2.6	32	2.2	5.8	.....	5.7	.0	30	3.8	.5	3.2	89
Aug. 23	Sept. 1	40	37	.92	2.6	26	.66	6.8	.....	......	.0	38	4.6	.6	4.2	75
Sept. 2	Sept. 11	170	113	.66	14	33	3.1	4.8	.....	7.6	.0	32	3.3	.6	.....	.....
Sept. 12	Sept. 21	30	28	.93	3.5	28	.8	6.4	3.4	9.4	.0	44	3.6	.5	4.2	81
Sept. 22	Oct. 1	120	76	.63	7.0	29	2.0	5.4	2.4	7.9	.0	34	3.9	.5	3.8	84
Mean		78	68	.79	2.8	26	1.4	5.9	1.8	7.9	.0	35	3.4	.3	4.4	73
Per ct. of anhydrous residue		.....	.....	.....	.....	37.7	[c]2.9	8.6	2.6	11.5	25.0	.....	4.9	.4	6.4	.....

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[a] Analyses October 1 to December 10, 1906, by R. B. Dole; December 11, 1906, to March 31, 1907, by R. B. Dole and M. G. Roberts; April 1 to July 2, 1907, by Chase Palmer and M. G. Roberts; July 3 to October 1, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from North Platte River near North Platte, Nebr.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—															
Sept. 10	Sept. 19	120	91	0.16	.....	0.10	57	8.5	28	0.0	161	54	Tr.	5.0	262	1.9
Sept. 20	Oct. 1	110	117	1.06	63	1.1	50	17	36	.0	167	114	1.8	6.7	285	2.0
Oct. 2	Oct. 14	90	68	.75	50	.10	40	11	29	.0	168	63	.4	6.1	277	1.9
Oct. 15	Oct. 24	85	71	.84	42	.15	46	11	31	.0	155	72	Tr.	7.9	289	2.0
Oct. 25	Nov. 3	290	275	.95	50	.15	41	11	27	.0	155	62	1.0	5.7	264	2.4
Nov. 4	Nov. 13	240	154	.64	25	.30	40	11	......	.0	169	69	1.3	9.2	292	2.4
Nov. 14	Nov. 23	150	129	.86	43	.40	50	12	35	.0	189	91	.4	9.0	327	2.1
Nov. 24	Dec. 3	130	116	.89	44	.20	46	11	35	.0	168	78	.4	6.7	300	2.2
Dec. 4	Dec. 13	160	118	.74	48	.35	50	16	37	.0	179	.....	1.3	8.0	333	....
Dec. 14	Dec. 23	140	115	.82	52	.15	51	15	39	.0	205	102	Tr.	9.2	372	....
Dec. 24	Jan. 2	150	122	.81	43	1.2	47	14	37	.0	178	88	Tr.	8.1	306	....
Jan. 3	Jan. 12	20	12	.60	35	Tr.	52	14	37	.0	198	97	.4	9.5	326	....
Jan. 13	Jan. 22	20	14	.70	36	.05	56	15	41	.0	212	102	.2	9.4	359	....
Jan. 23	Feb. 1	150	117	.78	37	.12	54	14	39	.0	187	84	.0	11	351	....
Feb. 3	Feb. 12	150	138	.92	30	.12	46	9.5	31	.0	162	76	.7	7.3	272	....
Feb. 13	Feb. 22	300	330	1.10	34	.10	52	12	......	.0	146	41	2.8	6.7	270	....
Feb. 23	Mar. 4	210	148	.70	45	.15	47	12	34	.0	170	82	1.6	7.0	309	....
Mar. 5	Mar. 15	240	148	.62	31	.08	52	14	36	.0	167	.....	.9	10	331	....
Mar. 16	Mar. 25	165	119	.72	30	Tr.	47	13	34	.0	186	86	.4	9.0	319	....
Mar. 26	Apr. 4	1,840	1,715	.93	56	.05	52	11	30	.0	146	112	.8	4.0	331	....
Apr. 5	Apr. 14	800	585	.73	52	.10	43	11	26	.0	145	77	1.8	6.7	314	2.5
Apr. 15	Apr. 24	675	436	.64	43	.30	44	12	28	.0	145	84	.7	7.3	285	2.4
Apr. 25	May 4	440	426	.97	41	.55	38	......	24	.0	135	67	.5	4.8	258	2.5
May 5	May 14	165	187	1.13	38	.20	39	11	23	.0	144	68	1.1	5.5	264	2.3
May 15	May 24	370	608	1.64	40	.22	42	10	31	.0	156	63	1.9	4.5	272	2.4
May 25	June 3	680	1,036	1.52	35	.40	41	7.9	26	.0	146	59	1.8	5.3	260	3.2
June 4	June 13	350	697	2.00	34	.48	38	9.4	21	.0	137	58	5.0	4.7	246	3.4
June 14	June 23	375	534	1.42	26	.18	43	6.2	32	.0	148	56	6.2	4.4	249	3.3
June 24	June 30	290	381	1.32	13	.05	39	5.1	26	.0	156	54	1.3	2.5	219	3.5
Mean.		307	311	.95	40	.26	46	12	32	.0	165	76	1.2	6.9	295	....
Per ct. of anhydrous residue.		......	......	.....	13.5	[b].1	15.6	4.1	10.8	27.5	.....	25.7	.4	2.3	.....	....

[a] Analyses September 10, 1906, to February 12, 1907, by W. M. Barr; February 13 to 22, 1907, by H. S. Spaulding; February 24 to June 30, 1907, by Walton Van Winkle.

[b] Fe_2O ,

Mineral analyses of water from Oconee River near Dublin, Ga.[a]

[Parts per million, unless otherwise stated.]

Date (1906–7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 18	Oct. 27	55	23	0.42	......	29	0.6	9.0	1.2	.....	0.0	33	.....	0.4	4.0	76	1.4
Oct. 28	Nov. 6	75	51	.68	......	32	2.0	11	.8	.....	.0	39	.....	.4	4.0	83	.6
Nov. 7	Nov. 17	85	28	.33	......	31	.9	8.8	1.2	.....	.0	32	.....	.7	2.0	68	.8
Nov. 18	Nov. 27	85	65	.76	......	24	.40	8.8	1.2	.....	.0	32	.....	.1	4.0	70	1.9
Nov. 28	Dec. 7	80	52	.65	......	26	.5	9.6	1.6	.....	.0	34	.....	.7	4.5	78	.9
Dec. 8	Dec. 17	155	94	.61	......	31	.7	12	.....	.....	.0	49	.....	.9	4.8	89	1.7
Dec. 19	Jan. 3	160	125	.78	......	28	1.2	8.3	.8	.....	.0	27	.....	.8	5.0	83	3.1
Jan. 4	Jan. 15	105	85	.81	......	20	.5	5.7	Tr.	.....	.0	20	.....	.4	4.0	61	3.4
Jan. 16	Jan. 26	38	32	.84	......	30	.9	14	4.4	.....	.0	51	.....	1.1	4.2	94	1.4
Jan. 27	Feb. 6	80	59	.74	......	26	.8	12	.....	.....	.0	56	.....	1.2	3.0	85	4.3
Feb. 7	Feb. 18	40	36	.90	......	22	1.0	5.6	1.2	.....	.0	20	.....	.5	5.0	60	7.5
Mar. 2	Mar. 11	240	204	.85	......	34	1.1	7.6	Tr.	.....	.0	27	.....	.6	2.5	69	6.9
Mar. 12	Mar. 21	110	100	.91	......	16	.6	9.6	1.2	.....	.0	32	.....	.4	2.0	50	3.2
Mar. 22	Mar. 31	35	28	.80	......	24	1.6	12	1.6	.....	.0	41	.....	.3	4.0	73	1.6
Apr. 1	Apr. 10	75	65	.87	......	20	1.3	9.6	1.6	.....	.0	32	.....	.2	6.5	64	1.6
Apr. 11	Apr. 24	185	176	.95	......	20	2.4	10	2.4	.....	.0	34	.....	.4	5.0	66	3.3
Apr. 25	May 4	95	75	.79	......	16	1.8	7.0	1.6	.....	.0	24	.....	.3	2.5	48	5.4
May 5	May 14	200	206	1.03	......	18	2.5	10	1.6	.....	.0	34	.....	.2	4.5	61	4.0
May 15	May 24	100	69	.69	6.1	18	.42	7.8	2.2	8.4	.0	44	5.4	4.0	2.2	70	1.9
May 25	June 3	350	232	.66	15	21	Tr.	7.7	2.0	11	.0	43	6.2	1.5	2.6	68	1.4
June 4	June 13	375	220	.59	16	22	Tr.	6.6	2.2	7.9	.0	45	5.6	1.0	1.9	69	.9
June 14	June 23	400	275	.69	16	11	Tr.	6.3	2.1	8.1	.0	38	6.0	Tr.	1.4	51	1.0
June 24	July 3	230	266	1.16	12	10	Tr.	6.6	3.2	8.3	.0	34	8.1	.6	1.8	54	2.4
July 4	July 14	350	354	1.01	15	15	Tr.	6.6	1.6	9.4	.0	37	4.9	3.2	2.4	57	1.6
July 15	July 24	400	233	.58	9.6	13	Tr.	7.1	1.9	6.2	[b]4.8	27	7.5	.6	3.1	62	.8
July 25	Aug. 2	650	504	.77	28	17	Tr.	6.3	1.9	8.1	.0	34	6.3	2.3	3.4	62	2.7
Aug. 4	Aug. 13	400	266	.66	19	14	.02	5.9	1.2	7.9	.0	32	6.1	2.0	2.9	55	.9
Aug. 15	Aug. 24	425	460	1.08	34	21	Tr.	7.2	.9	10	.0	40	5.4	4.2	3.1	74	2.0
Aug. 26	Sept. 7	290	205	.71	16	18	Tr.	6.9	1.1	7.9	.0	40	5.0	.7	2.4	62	.7
Sept. 8	Sept. 17	400	328	.82	24	18	Tr.	6.4	1.1	12	.0	41	5.5	1.0	2.6	63	1.0
Sept. 28	Oct. 7	350	379	1.08	15	16	.02	11	1.7	8.3	.0	54	7.4	1.7	4.9	84	3.9
Oct. 8	Oct. 17	40	....	......	3.5	15	.6	8.5	1.9	9.2	.0	50	7.5	Tr.	2.8	....	.4
Mean		208	171	.78	......	21	.68	8.5	1.6	8.8	.0	37	6.2	1.0	3.4	68	....
Per ct. of anhydrous residue		....	....	......	......	30.2	[c]1.4	12.2	2.3	12.6	26.1	.....	8.9	1.4	4 9	....	....

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[a] Analyses October 18, 1906, to May 14, 1907, by J. R. Evans; May 15 to October 17, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO in the average.

[c] Fe_2O_3.

Mineral analyses of water from Ocmulgee River near Macon, Ga.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 19	Oct. 28	35	27	0.77	.....	12	0.6	5.6	1.6	.....	0.0	20	.....	0.1	4.0	50	3.7
Oct. 29	Nov. 7	49	14	.29	.....	32	.5	5.2	.8	.....	.0	22	.....	.5	3.0	66	2.9
Nov. 8	Nov. 17	50	18	.36	.....	30	.20	8.3	Tr.	.....	.0	27	.....	.5	1.5	77	3.0
Nov. 18	Nov. 27	65	26	.40	.....	30	.30	7.5	1.2	.....	.0	22	.....	.2	1.8	72	4.0
Nov. 28	Dec. 7	60	24	.40	.....	26	.9	8.1	1.6	.....	.0	25	.....	.6	1.5	77	2.8
Dec. 8	Dec. 17	75	46	.61	.....	29	.7	9.6	1.2	.....	.0	32	.....	.8	1.7	75	3.3
Dec. 21	Jan. 4	30	20	.67	.....	26	.9	4.4	Tr.	.....	.0	15	.....	.1	4.0	56	5.4
Jan. 5	Jan. 16	60	42	.70	.....	18	.8	3.6	Tr.	.....	.0	12	.....	.5	3.5	88	4.3
Jan. 17	Jan. 26	40	28	.70	.....	21	.8	3.6	Tr.	.....	.0	12	.....	.4	2.0	46	3.3
Jan. 27	Feb. 5	240	189	.79	.....	34	1.8	4.6	2.4	.....	.0	....	.....	.5	2.5	64	7.2
Feb. 6	Feb. 15	75	60	.80	.....	32	.8	7.6	Tr.	.....	.0	24	.....	.4	2.0	58	7.8
Feb. 16	Feb. 25	40	33	.83	.....	33	.7	8.0	1.6	.....	.0	27	.....	.3	1.5	57	4.0
Feb. 26	Mar. 7	210	178	.85	.....	38	1.4	6.8	Tr.	.....	.0	22	.....	1.2	3.5	71	8.9
Mar. 8	Mar. 17	55	46	.84	.....	15	.8	6.0	0.8	.....	.0	20	.....	.6	3.0	47	5.0
Mar. 18	Mar. 27	35	27	.77	.....	14	1.0	9.6	Tr.	.....	.0	29	.....	.5	3.5	52	3.4
Mar. 28	Apr. 6	25	23	.92	.....	27	1.2	11	Tr.	.....	.0	34	.....	.7	3.5	70	3.1
Apr. 7	Apr. 16	30	29	.97	.....	23	2.1	9.2	Tr.	.....	.0	29	.....	.8	4.0	64	3.4
Apr. 17	Apr. 26	560	511	.91	.....	21	1.7	5.5	1.2	.....	.0	24	.....	1.6	2.5	48	7.7
Apr. 27	May 6	450	416	.92	.....	24	1.4	4.5	.8	.....	.0	15	.....	1.8	3.0	50	5.3
May 7	May 16	204	158	.77	.....	31	1.1	6.7	.....	10	.0	40	3.3	1.0	5.0	96	4.5
May 17	May 26	45	31	.69	.....	25	2.0	5.7	2.9	8.1	.0	43	2.0	.3	4.0	85	3.0
May 27	June 5	310	234	.75	.....	26	1.2	4.9	2.8	11	.0	....	5.9	.4	2.5	91	3.1
June 6	June 15	226	179	.79	.....	23	1.2	5.7	2.6	4.4	.0	37	4.9	.4	3.0	78	2.8
June 16	June 26	410	241	.59	.....	25	2.4	4.1	2.4	6.9	.0	31	4.8	1.1	4.0	86	2.5
June 27	July 11	670	527	.79	.....	23	2.0	6.5	1.5	6.3	.0	31	5.2	.7	3.5	84	4.3
July 12	July 21	416	331	.79	.....	32	1.6	8.1	2.2	7.5	.0	41	6.8	1.0	4.0	94	2.2
Aug. 3	Aug. 12	1,100	807	.73	21	7.5	Tr.	5.0	1.5	6.8	.0	24	4.7	1.1	1.4	35	2.7
Aug. 13	Aug. 22	580	552	.95	35	21	Tr.	5.8	1.8	11	.0	40	4.3	1.2	1.8	64	3.3
Aug. 24	Sept. 9	550	414	.75	16	16	Tr.	5.8	1.8	6.6	.0	32	4.7	1.3	2.6	53	1.7
Sept. 10	Sept. 19	270	133	.49	10	41	Tr.	6.4	2.3	7.4	.0	38	5.8	.9	1.0	87	1.1
Sept. 20	Sept. 30	400	260	.65	8.9	29	Tr.	5.1	1.8	11	.0	34	6.4	1.0	2.3	70	3.7
Oct. 1	Oct. 10	180	90	.50	2.6	42	Tr.	5.7	1.8	11	.0	37	.....	.7	3.0	85	1.6
Oct. 12	Oct. 21	35	32	.91	1.1	28	Tr.	4.7	1.4	8.1	.0	30	5.5	.6	3.2	70	.9
Mean		230	174	.72	.....	26	.9	6.3	1.2	8.3	.0	28	4.9	.7	2.8	69	....
Per ct. of anhydrous residue		......	....	.....	.....	39.8	[b]2.0	9.6	1.8	12.7	21.2	....	7.5	1.1	4.3	....	....

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[a] Analyses October 19, 1906, to May 6, 1907, by J. R. Evans; May 7 to July 21, 1907, by W. D. Collins; August 3 to October 21, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Oostanaula River near Rome, Ga.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
Oct. 21	Oct. 30	25	18	0.72	....	9.6	Tr.	12	.....	.....	0.0	39	.....	0.1	2.0	63	6.1
Oct. 31	Nov. 9	40	14	.35	....	23	0.30	12	.....	.....	.0	46	.....	.6	3.0	81	2.8
Nov. 10	Nov. 19	140	120	.86	....	34	.40	9.9	.....	.....	.0	39	.....	.3	.....	79	3.3
Nov. 20	Dec. 1	125	96	.77	....	34	.6	11	1.2	.....	.0	37	.....	.4	1.5	85	14.4
Dec. 2	Dec. 11	95	69	.73	....	29	.40	9.6	.....	.....	.0	34	.....	.6	1.5	70	3.6
Dec. 12	Dec. 21	105	77	.73	....	27	.9	8.2	1.2	.....	.0	32	.....	.8	1.8	66	6.3
Dec. 22	Dec. 31	70	53	.76	....	25	.7	11	1.6	.....	.0	44	.....	.4	2.0	82	6.6
Jan. 1	Jan. 10	65	41	.63	....	22	.8	9.6	1.2	.....	.0	37	.....	.6	1.5	62	8.0
Jan. 11	Jan. 20	25	16	.64	....	14	.20	11	1.2	.....	.0	37	.....	1.0	1.8	67	3.0
Jan. 21	Jan. 31	30	21	.70	....	21	.8	13	1.2	.....	.0	44	.....	.2	1.5	75	3.2
Feb. 1	Feb. 10	40	28	.70	....	18	.6	11	3.2	.....	.0	41	.....	.7	2.0	66	9.0
Feb. 11	Feb. 20	4	3.6	.90	....	13	.7	11	0.8	.....	.0	37	.....	.3	2.0	54	3.6
Feb. 21	Mar. 4	165	124	.75	....	33	1.3	14	2.0	.....	.0	44	.....	.4	3.0	83	9.7
Mar. 5	Mar. 14	45	38	.84	....	16	.9	7.6	Tr.	.....	.0	24	.....	.4	2.0	47	6.1
Mar. 15	Mar. 24	25	23	.92	....	18	1.2	15	1.2	.....	.0	51	.....	.8	1.0	76	4.0
Mar. 25	Apr. 3	12	10	.83	....	19	1.2	11	.....	.....	.0	34	.....	.6	2.5	62	3.1
Apr. 4	Apr. 13	65	56	.86	....	17	1.4	14	3.2	.....	.0	....	.....	.4	2.0	70	3.4
Apr. 14	Apr. 23	60	56	.93	....	8.8	1.4	15	4.0	.....	.0	59	.....	.2	2.0	68	3.6
Apr. 24	May 2	260	236	.91	....	7.8	1.6	13	.....	.....	.0	51	.....	.0	3.0	61	4.7
May 3	May 13	220	220	1.00	....	18	.7	15	3.3	8.8	.0	72	2.6	.8	1.0	100	4.2
May 14	May 23	150	149	1.00	....	18	1.0	11	3.1	11	.0	72	4.3	.0	1.5	92	5.4
May 24	June 5	340	318	.93	....	29	1.6	12	3.2	11	.0	71	4.3	.6	1.5	120	5.0
June 6	June 15	200	170	.85	....	25	.6	......	3.3	6.0	.0	74	4.8	.0	2.5	99	3.8
June 16	June 26	180	114	.63	....	28	.40	14	4.1	8.2	.0	78	3.6	.6	2.0	101	2.4
June 27	July 7	415	378	.91	....	26	1.2	12	3.7	6.6	.0	68	3.8	.7	2.0	106	2.9
July 8	July 17	370	370	1.00	....	39	.8	13	3.9	12	.0	78	5.5	.4	2.0	122	2.4
Aug. 7	Aug. 16	260	234	.90	....	31	Tr.	9.6	4.6	13	.0	73	5.1	1.0	1.0	105	1.9
Aug. 17	Aug. 26	260	198	.76	....	23	Tr.	13	2.9	9.4	.0	67	4.8	1.0	0.6	87	2.0
Sept. 27	Oct. 6	125	87	.70	....	47	Tr.	7.3	3.2	7.6	.0	51	3.6	.5	1.7	109	2.6
Oct. 7	Oct. 17	45	37	.80	1.2	44	Tr.	14	5.0	7.9	.0	74	3.8	....	1.2	118	1.5
Oct. 18	Oct. 28	10	8.8	.88	Tr.	17	Tr.	11	2.9	9.1	.0	70	3.3	....	1.8	81	1.0
Mean		128	109	.80	....	24	.7	12	2.6	9.2	.0	53	4.1	.4	1.8	82	....
Per ct. of anhydrous residue		....	......	.....	....	29.6	[b]1.2	14.8	3.2	11.3	32.2	....	5.0	.5	2.2	....	....

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[a] Analyses October 21, 1906, to May 2, 1907, by Jas. R. Evans; May 2 to July 17, 1907, by W. D. Collins; August 7 to October 28, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Oswegatchie River at Ogdensburg, N. Y.[a]

[Parts per million, unless otherwise stated.]

Date. (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Aug. 28	Sept. 10	8	8	1.00	1.2	12	0.4	11	2.9	.....	0.0	45	6.2	0.0	Tr.	80	4.6
Sept. 11	Sept. 20	9	9	1.00	.3	14	.28	11	3.2	.....	.0	45	4.8	.0	Tr.	82	4.8
Sept. 21	Sept. 30	7	6	.86	.5	13	.4	12	3.4	.....	.0	49	7.4	Tr.	Tr.	91	4.6
Oct. 1	Oct. 10	8	6	.75	5.2	13	Tr.	9.6	4.8	.....	.0	36	7.2	.0	Tr.	81	5.1
Oct. 11	Oct. 20	6	6.4	1.07	.2	13	Tr.	12	3.6	.....	.0	46	6.6	Tr.	Tr	83	6.0
Oct. 21	Oct. 30	8	14	1.75	.5	15	Tr.	14	4.0	6.9	.0	59	7.1	Tr.	Tr.	90	6.6
Oct. 31	Nov. 9	7	4.6	.66	.1	14	.10	15	3.8	6.5	.0	64	7.9	.0	Tr.	94	6.0
Nov. 10	Nov. 20	9	13	1.44	.5	16	.20	15	4.0	6.1	.0	59	13	.0	Tr.	100	5.5
Nov. 22	Nov. 30	10	9.0	.90	.6	11	.30	13	3.6	4.9	.0	56	8.6	.0	Tr.	83	6.3
Dec. 1	Dec. 11	6	9.4	1.57	.1	7.8	.10	15	3.4	5.8	.0	59	8.6	Tr.	Tr.	84	6.1
Dec. 12	Dec. 22	5	2.8	.56	.7	10	.18	13	4.4	4.9	.0	53	9.0	.9	.7	79	5.7
Dec. 23	Jan. 1	7	4.8	.68	.6	8.5	.21	15	4.8	3.5	.0	59	8.5	.6	.5	83	5.4
Jan. 2	Jan. 11	17	14	.82	.6	8.8	.21	13	4.0	3.3	.0	51	7.9	.6	.2	72	7.0
Jan. 12	Jan. 21	6	3.4	.57	.4	7.5	.16	14	4.2	3.6	.0	52	6.9	1.0	.6	78	6.5
Jan. 22	Feb. 1	7	4.2	.60	.3	8.0	.16	12	3.4	3.5	.0	51	7.7	.6	1.6	72	6.5
Feb. 2	Feb. 12	18	16	.89	.3	5.6	.10	13	2.0	4.1	[b]6.8	40	6.4	.0	Tr.	70	5.1
Feb. 13	Feb. 22	9	4.4	.49	.4	8.6	.18	12	2.8	4.9	.0	46	7.1	1.0	2.2	69	4.7
Feb. 23	Mar. 6	10	5.6	.56	.4	8.4	.14	12	2.8	3.9	.0	44	8.7	1.2	Tr.	70	4.6
Mar. 7	Mar. 18	7	3.2	.46	.3	9.2	.14	10	2.8	5.2	.0	37	9.4	1.9	Tr.	67	4.9
Mar. 19	Mar. 29	10	30	3.00	.8	3.0	.05	11	2.8	5.7	.....	.....	6.8	.0	Tr.	64	6.8
Apr. 10	Apr. 19	6	10	1.67	.5	12	.13	14	3.9	6.8	.0	59	7.1	1.9	1.9	78	6.3
Apr. 20	Apr. 30	9	17	1.89	.8	12	.15	14	4.1	6.3	.0	60	7.2	1.0	.2	80	5.5
May 1	May 10	23	27	1.18	1.4	.....	.30	14	3.7	6.4	.0	57	7.6	1.4	.6	87	6.8
May 11	May 20	8	21	2.62	.7	8.2	.10	14	3.8	7.5	[b]2.4	56	7.1	Tr.	1.0	75	6.3
May 21	May 30	3	8.5	2.83	.4	7.6	.13	13	3.6	6.1	.0	56	7.6	Tr.	.6	74	5.4
May 31	June 9	8	17	2.12	.5	7.2	.14	14	3.5	4.6	[b]4.1	53	7.1	.8	.2	73	5.3
June 11	June 20	3	18	6.00	.5	8.2	.12	14	3.9	4.6	.0	61	7.4	.8	.6	78	4.9
June 21	June 30	8	13	1.62	1.0	.....	.35	12	3.2	5.6	.0	64	9.1	.5	.2	88	4.8
July 1	July 10	15	13	.87	.8	6.4	.30	12	3.6	.....	.....	.....	10	Tr.	.6	69	4.9
July 11	July 20	10	17	1.70	.8	6.6	.21	12	2.7	6.3	.0	49	9.3	Tr.	Tr.	69	4.7
July 21	July 30	10	11	1.10	.8	5.4	.35	12	3.8	5.4	.0	....	8.2	Tr.	Tr.	62	4.5
July 31	Aug. 10	5	5.6	1.12	.9	6.2	.44	11	3.3	4.7	.0	....	9.4	.3	1.2	60	4.5
Aug. 11	Aug. 20	5	7.2	1.44	.9	7.6	.52	11	3.2	.....	.0	....	10	.2	.6	65	4.4
Aug. 21	Aug. 30	7	7.2	1.03	.9	9.4	.56	10	3.4	.....	.0	....	12	.2	1.2	75	4.4
Aug. 31	Sept.. 9	3	4.6	1.53	.8	7.6	.35	10	3.5	6.3	.0	....	13	.2	Tr.	70	4.5
Mean............		8	10	1.38	.7	9.4	.21	13	3.5	5.3	.0	53	8.2	.4	.4	77	....
Per ct. of anhydrous residue..		....	......	......	....	14.1	[c].4	19.5	5.3	8.0	39.2	....	12.3	.6	.6	....	....

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[a] Analyses August 28 to December 11, 1906, by R. B. Dole; December 12, 1906, to March 29, 1907, by R. B. Dole and M. G. Roberts; April 10 to June 30, 1907, by Chase Palmer and M. G. Roberts; July 1 to September 9, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Pearl River near Jackson, Miss.[a]

[Parts per million, unless otherwise stated.]

Date. (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 16	Oct. 26	45	28	0.62	......	13	.....	5.2	0.8	.....	0.0	20	.....	0.4	5.0	48	17.8
Oct. 27	Nov. 8	75	38	.51	......	27	0.20	5.5	.8	.....	.0	22	.....	.9	4.0	69	3.0
Nov. 9	Nov. 20	30	8.0	.67	......	21	.7	9.6	1.2	.....	.0	32	....	.4	1.8	67	2.0
Nov. 21	Dec. 3	35	14	.40	......	23	.8	10	1.6	.....	.0	34	.....	.7	2.0	72	3.3
Dec. 4	Dec. 15	40	22	.55	......	19	.7	12	1.2	.....	.0	41	.....	.9	2.2	65	3.4
Dec. 26	Jan. 5	105	76	.72	......	28	.30	6.5	Tr.	.....	.0	22	.....	.5	6.0	62	7.8
Jan. 6	Jan. 15	55	47	.85	......	32	.9	4.7	.4	.....	.0	20	.....	1.0	4.2	77	9.6
Jan. 16	Jan. 26	25	18	.72	......	19	.6	.	1.6	.....	.0	54	.....	.7	6.0	76	5.0
Jan. 28	Feb. 6	60	38	.63	......	19	.5	4.4	1.2	.....	.0	....	.....	.9	4.0	52	7.9
Feb. 7	Feb. 16	30	26	.87	......	15	.40	4.4	1.2	.....	.0	15	.....	.3	3.5	43	18.5
Feb. 17	Feb. 26	90	84	.93	......	20	.10	4.4	Tr.	.....	.0	....	.....	.1	3.5	46	8.9
Mar. 1	Mar. 16	85	63	.74	......	14	.20	4.4	Tr.	.....	.0	12	.....	.2	4.0	36	23.0
Mar. 17	Mar. 26	60	40	.67	......	13	.10	10	1.6	.....	.0	34	.....	.5	1.8	50	9.5
Mar. 27	Apr. 5	30	26	.87	......	20	.40	8.8	.8	.....	.0	29	.....	.8	4.5	61	4.3
Apr. 6	Apr. 18	160	175	1.10	......	16	.5	8.4	Tr.	.....	.0	27	.....	.6	2.5	60	3.7
Apr. 19	Apr. 29	35	56	1.60	......	31	2.8	4.0	.....	.....	.0	....	.....	.7	2.5	52	7.9
Apr. 30	May 9	170	147	.86	......	23	1.7	5.0	Tr.	....	.0	17	.....	.9	3.0	46	12.4
May 10	May 23	60	47	.78	2.8	10	.05	5.1	1.2	7.9	.0	28	5.5	1.0	2.5	50	21.0
May 24	June 2	60	50	.83	6.6	11	.10	6.2	1.6	6.7	.0	28	6.7	1.1	2.6	45	12.7
June 3	June 13	45	38	.84	4.4	26	.07	7.9	1.4	8.3	.0	44	6.6	1.0	3.1	79	5.4
June 14	June 23	50	50	1.00	9.6	24	.04	8.1	1.6	11	.0	44	7.4	1.2	3.4	74	3.6
June 24	July 3	50	50	1.00	11	20	Tr.	9.7	1.6	13	.0	56	6.2	.5	3.2	76	2.7
July 4	July 13	100	59	.59	7.0	13	.03	7.0	1.9	14	.0	30	11	.....	5.5	75	3.4
July 14	July 23	45	36	.80	7.9	15	.03	8.6	1.7	9.6	.0	45	6.9	.9	3.2	65	2.6
July 24	Aug. 3	15	41	2.73	3.5	13	.03	9.7	1.6	8.8	.0	40	6.8	Tr.	2.9	54	1.9
Aug. 4	Aug. 14	30	15	.50	3.5	11	.03	8.3	1.7	7.6	.0	40	6.2	.7	2.6	52	1.9
Aug. 15	Aug. 24	45	37	.82	2.4	11	.04	7.7	1.4	8.3	.0	32	6.1	2.2	5.0	59	2.1
Aug. 25	Sept. 3	45	33	.73	5.2	12	.04	6.3	.9	7.9	.0	29	4.9	.8	2.6	53	2.5
Sept. 4	Sept. 14	40	37	.92	3.2	13	.04	7.4	1.0	9.2	.0	38	4.8	.0	2.6	56	1.9
Sept. 15	Sept. 26	50	32	.64	6.1	9.7	.03	6.9	1.5	4.7	.0	30	4.7	.7	2.4	41	1.5
Sept. 27	Oct. 7	10	16	1.60	2.8	14	.03	8.0	2.1	8.3	.0	41	6.0	Tr.	3.6	63	1.0
Oct. 8	Oct. 19	30	21	.70	2.3	8.9	.03	6.9	1.3	8.3	.0	37	5.6	.2	2.9	52	1.3
Mean		56	46	.93	......	18	.37	7.1	1.1	8.9	.0	32	6.4	.7	3.4	59	....
Per ct. of anhydrous residue		....	.....	......	......	29.1	[b].8	11.5	1.8	14.4	25.5	....	10.3	1.1	5.5	....	....

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[a] Analyses October 16, 1906, to May 8, 1907, by Jas. R. Evans; May 10 to October 19, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Pedee River near Pedee, N. C.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—																
Oct. 26	Nov. 5	40	28	0.70	.....	39	Tr.	9.1	1.6	......	0.0	34	.....	0.4	3.5	87	3.0
Nov. 6	Nov. 16	90	46	.51	.....	30	0.9	5.7	Tr.	......	.0	20	.....	.6	2.0	62	2.8
Nov. 17	Nov. 29	140	100	.71	.....	32	.9	4.7	Tr.	......	.0	16	.....	.3	7.5	82	3.9
Nov. 30	Dec. 11	135	88	.65	.....	30	.8	5.5	Tr.	......	.0	20	.....	.5	7.0	78	2.8
Dec. 12	Dec. 21	140	102	.73	.....	26	.8	6.4	1.2	......	.0	22	.....	.6	7.5	74	3.1
Dec. 27	Jan. 8	145	108	.75	.....	30	.40	5.2	Tr.	......	.0	17	.....	.6	4.0	72	3.8
Jan. 9	Jan. 21	15	11	.73	.....	25	.20	7.4	1.6	......	.0	27	.....	.4	1.7	63	2.8
Jan. 22	Feb. 3	25	16	.64	.....	18	.30	8.4	1.6	......	.0	32	.....	.9	3.0	58	2.6
Feb. 6	Feb. 19	15	12	.80	.....	13	.20	9.2	1.6	......	.0	32	.....	.4	4.5	58	2.7
Feb. 20	Mar. 15	40	34	.85	.....	14	.10	12	0.8	......	.0	41	.....	.4	1.5	64	3.2
Mar. 16	Mar. 30	25	24	.96	.....	18	.10	10	1.2	......	.0	34	.....	.7	3.5	59	2.8
Mar. 31	Apr. 15	20	18	.90	.....	26	.30	7.6	Tr.	......	.0	24	.....	.4	2.0	45	3.1
Apr. 16	Apr. 25	120	110	.92	.....	15	.20	7.0	1.2	......	.0	24	.....	.2	2.0	45	3.1
Apr. 26	May 1	160	168	1.05	.....	18	.40	5.5	1.2	......	.0	20	.....	.3	3.0	40	3.4
May 2	May 11	100	74	.74	.....	20	[c]1.4	6.5	2.9	7.2	.0	44	4.0	.5	3.0	76	2.9
May 12	May 21	60	44	.73	.....	27	.40	6.7	3.3	7.8	.0	42	3.6	.2	3.5	78	2.5
May 22	June 3	255	211	.77	.....	21	.8	5.1	2.1	11	.0	39	3.6	.4	4.5	74	2.8
June 18	June 28	365	302	.83	.....	26	[c]2.8	4.1	3.7	7.2	.0	39	2.3	.5	3.0	86	3.0
June 29	July 10	375	238	.63	.....	37	Tr.	5.1	1.3	14	.0	48	4.4	1.4	1.4	91	3.2
Aug. 19	Aug. 31	270	128	.47	6.3	34	Tr.	5.8	0.8	13	.0	45	3.9	.9	1.6	86	2.4
Sept. 1	Sept. 13	240	115	.48	10	23	.03	6.8	1.7	9.4	.0	44	3.9	.5	1.1	64	2.3
Sept. 14	Sept. 28	295	199	.67	8.8	35	.03	4.9	1.3	5.4	.0	26	4.7	.7	.7	70	2.8
Oct. 2	Oct. 15	45	42	.93	2.4	26	Tr.	6.6	0.8	6.5	.0	29	3.9	.3	1.2	62	2.4
Oct. 16	Oct. 19	35	34	.97	.....	30	Tr.	9.3	1.7	7.2	.0	43	5.6	1.1	1.1	78	2.2
Mean............		131	94	.76	.....	26	.31	6.9	1.3	8.9	.0	32	4.0	.6	3.1	69	....
Per ct. of anhydrous residue..		....	....	.....	.....	38.8	[d].7	10.3	1.9	13.3	23.6	.....	6.0	.8	4.6	....	....

[a] Analyses October 26, 1906, to May 1, 1907, by Jas. R. Evans; May 2 to June 28, 1907, by W. D. Collins; June 29 to October 19, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station at Cheraw, S. C., 20 miles below.

[c] Abnormal; computed as HCO_3 in the average.

[d] Fe_2O_3.

Mineral analyses of water from Platte River near Columbus, Nebr.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO$_2$).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO$_3$).	Bicarbonate radicle (HCO$_3$).	Sulphate radicle (SO$_4$).	Nitrate radicle (NO$_3$).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—															
Oct. 1	Oct. 11	20	21	1.05	31	Tr.	56	15	40	0.0	189	112	0.0	12	361	1.8
Oct. 12	Oct. 21	50	41	.82	33	0.10	55	16	40	.0	187	113	.7	11	353	2.2
Oct. 22	Nov. 2	350	311	.89	37	.20	44	.....	34	.0	167	74	.4	8.4	296	3.0
Nov. 3	Nov. 12	625	542	.87	47	.20	52	13	39	.0	181	86	1.8	9.6	349	3.5
Nov. 13	Nov. 22	300	244	.81	32	.20	66	17	50	.0	195	134	.4	13	412	3.2
Nov. 23	Dec. 2	210	178	.85	26	.20	64	17	.....	.0	187	167	Tr.	14	441	3.0
Dec. 3	Dec. 13	180	162	.90	36	.07	73	22	.....	.0	204	.....	.4	19	543	.....
Dec. 14	Dec. 23	50	48	.96	35	.05	77	25	77	.0	220	223	.9	19	561	.....
Dec. 24	Jan. 2	60	46	.77	27	.10	65	25	51	.0	190	181	.9	15	446	.....
Jan. 3	Jan. 12	20	27	1.35	26	.05	71	23	49	.0	207	206	.9	17	510	.....
Jan. 13	Jan. 22	15	.....	.....	32	Tr.	74	21	46	.0	152	191	.7	16	496	.....
Jan. 23	Feb. 1	20	8.0	.40	22	.08	74	23	55	.0	216	186	1.4	17	487	.....
Feb. 2	Feb. 12	15	10	.67	22	.10	73	20	56	.0	198	189	5.2	16	473	.....
Feb. 15	Feb. 24	215	110	.51	31	Tr.	46	15	.....	.0	148	101	2.3	8.5	309	.....
Feb. 25	Mar. 6	115	90	.78	30	Tr.	66	16	52	.0	192	.....	1.4	13	443	.....
Mar. 7	Mar. 16	580	432	.75	35	.9	72	20	52	.0	186	194	2.3	17	530	.....
Mar. 17	Mar. 26	325	264	.84	28	.25	68	23	39	.0	200	.....	2.0	20	522	.....
Mar. 27	Apr. 5	700	534	.76	33	.35	57	16	60	.0	184	172	1.2	16	454	3.2
Apr. 6	Apr. 15	2,000	1,432	.72	26	.35	56	13	47	.0	175	144	2.7	......	385	3.0
Apr. 16	Apr. 26	800	,638	.80	32	.20	63	18	46	.0	182	155	1.6	13	437	2.8
Apr. 27	May 6	900	774	.86	50	1.0	58	14	39	.0	161	130	1.1	10	407	3.2
May 7	May 15	580	385	.66	38	.6	55	16	41	.0	168	128	.9	11	389	2.9
Mean		374	300	.81	32	.20	63	18	48	.0	186	152	1.3	14	437	.....
Per ct. of anhydrous residue		......	......	......	7.6	[b].1	15.0	4.3	11.4	21.8	.....	36.2	.3	3.3	.....	.....

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[a] Analyses October 1, 1906, to February 12, 1907, by W. M. Barr; February 15 to 24, 1907, by H. S. Spaulding; February 25 to March 6, 1907, by Walton Van Winkle.

[b] Fe_2O_3

Mineral analyses of water from Platte River at Fremont, Nebr.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—														
Oct. 10	Oct. 20	100	88	0.88	50	0.10	47	......	36	0.0	199	37	0.0	4.9	265
Oct. 21	Oct. 31	290	537	1.85	44	.40	44	12	......	.0	157	51	.9	4.5	246
Nov. 1	Nov. 10	540	632	1.17	49	.40	47	12	32	.0	161	71	1.3	7.3	303
Nov. 11	Nov. 20	400	335	.84	42	.40	54	14	41	.0	......	97	.9	9.0	359
Nov. 21	Nov. 30	170	174	1.02	43	.16	53	19	......	.0	184	86	.9	7.7	328
Dec. 1	Dec. 10	270	272	1.01	51	.20	52	14	34	.0	193	107	1.3	8.5	364
Dec. 11	Dec. 20	125	111	.89	46	Tr.	61	16	38	.0	218	111	.4	7.5	385
Dec. 21	Dec. 30	......	193	......	44	Tr.	60	14	33	.0	221	93	Tr.	8.1	352
Dec. 31	Jan. 9	80	52	.65	38	.15	53	15	34	.0	185	97	1.4	8.4	339
Jan. 10	Jan. 27	10	13	1.30	47	Tr.	62	13	40	.0	237	79	1.3	7.8	391
Jan. 28	Feb. 6	10	10	1.00	47	.15	57	15	34	.0	209	80	1.9	7.1	335
Mar. 13	Mar. 22	675	442	.65	40	.28	53	13	31	.0	199	82	Tr.	8.8	341
Mar. 24	Apr. 5	460	544	1.18	35	.32	57	16	32	.0	192	95	.6	7.1	387
Apr. 6	Apr. 17	1050	814	.77	44	.30	47	11	26	.0	176	75	.8	6.9	298
Apr. 18	Apr. 27	540	477	.88	49	.45	......	13	33	.0	181	83	Tr.	10	347
Apr. 28	May 8	510	536	1.05	62	.6	45	11	37	.0	168	71	1.1	5.4	322
May 9	May 18	......	......	......	50	.40	49	12	......	.0	170	71	.7	5.7	308
May 19	May 29	485	649	1.34	50	.40	43	13	24	.0	168	57	2.3	4.8	280
May 30	June 8	700	980	1.40	44	.23	41	9.3	23	.0	160	51	2.4	6.7	256
June 9	June 18	600	804	1.34	41	.12	38	8.3	23	.0	160	50	3.0	4.0	251
June 20	June 29	625	514	.82	55	.8	40	11	27	.0	169	52	1.8	3.8	283
June 30	July 10	850	689	.81	......	.10	41	5.9	29	.0	154	45	1.8	4.5	228
July 11	July 20	1,050	1,725	1.64	51	.8	38	4.4	25	.0	142	42	2.4	2.6	241
July 21	July 30	500	427	.85	32	.08	39	4.5	......	.0	152	49	.9	......	337
July 31	Aug. 10	375	343	.91	42	.20	41	8.7	34	.0	186	49	Tr.	6.5	260
Aug. 11	Aug. 20	450	332	.74	45	.15	44	10	27	.0	167	64	.9	5.7	274
Aug. 21	Aug. 31	95	100	1.05	49	.15	43	9.9	25	.0	166	51	Tr.	5.0	274
Sept. 1	Sept. 10	230	224	.97	44	.12	43	9.5	24	.0	165	46	1.8	4.8	253
Sept. 11	Sept. 21	90	93	1.03	63	.10	45	8.2	15	[b]4.8	161	37	0.3	6.6	271
Sept. 22	Oct. 1	95	99	1.04	62	.10	40	4.2	20	[b]4.8	155	24	0.3	3.0	243
Oct. 2	Oct. 11	200	168	.84	60	.66	41	8.6	31	[b]6.0	162	41	1.0	6.0	270
Oct. 12	Oct. 23	75	76	1.01	45	.06	45	9.4	32	[b]4.8	167	58	0.5	7.4	280
Oct. 24	Nov. 2	100	87	.87	51	.14	46	9.7	32	[b]6.0	160	61	0.8	7.8	290
Mean		379	392	1.03	47	.26	47	11	30	.0	178	66	1.0	6.4	302
Per ct. of anhydrous residue		......	......	......	15.9	[c].1	15.9	3.7	10.1	29.6	......	22.3	.3	2.1	......

[a] Analyses October 10, 1906, to February 6, 1907, by W. M. Barr; March 13, to September 10, 1907, by Walton Van Winkle; September 11 to November 2, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Potomac River at Cumberland, Md.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
Sept. 11	Sept. 20	10	13	1.30	1.4	9.0	Tr.	39	7.4	8.5	0.0	46	96	1.7	12	204	3.1
Sept. 21	Sept. 30	6	12	2.00	.1	12	Tr.	45	8.6	12	.0	51	117	.5	16	234	2.6
Oct. 1	Oct. 11	18	19	1.06	2.1	6.0	0.20	33	5.6	4.9	.0	51	59	.5	9.0	157	2.4
Oct. 12	Oct. 21	21	19	.90	1.7	8.0	.10	30	4.8	9.3	.0	43	62	.8	11	150	2.7
Oct. 22	Oct. 31	8	17	2.13	.9	6.4	.20	19	3.2	7.4	.0	37	34	.3	5.0	97	3.5
Nov. 1	Nov. 10	8	6.0	.75	1.2	7.4	.05	27	4.4	8.0	.0	45	53	.0	9.5	134	3.5
Nov. 12	Nov. 21	14	14	1.00	1.1	5.0	.14	29	4.6	8.5	.0	42	63	Tr.	9.8	144	3.6
Nov. 22	Dec. 2	8	7.8	.98	.9	7.0	.30	20	3.8	......	.0	22	36	1.0	6.7	98	3.4
Dec. 3	Dec. 12	29	26	.90	1.6	10	.20	20	3.4	......	.0	30	34	1.0	7.2	100	4.1
Dec. 13	Dec. 22	27	25	.93	1.7	13	.20	13	2.6	6.6	.0	39	24	.9	4.1	80	5.7
Dec. 23	Jan. 1	34	34	1.00	2.1	5.2	.16	17	3.8	4.9	.0	36	42	1.5	3.8	84	4.3
Jan. 2	Jan. 11	22	23	1.04	2.1	5.2	.20	15	3.4	4.4	.0	32	37	1.4	2.8	79	5.0
Jan. 12	Jan. 21	80	78	.97	6.6	5.8	.15	12	2.6	4.7	.0	19	26	2.0	3.8	63	7.4
Jan. 22	Jan. 31	28	20	.71	2.8	14	.06	23	5.8	19	[b]12	22	76	1.4	4.4	159	5.1
Feb. 1	Feb. 10	26	8.0	.32	1.9	14	.09	23	5.4	4.4	.0	25	64	1.8	3.4	128	3.7
Feb. 11	Feb. 20	26	9.4	.37	1.9	6.8	.08	23	5.2	4.3	.0	29	63	1.8	3.4	122	3.6
Feb. 21	Mar. 2	33	6.8	.21	1.6	5.8	.08	22	4.8	3.2	.0	28	55	1.2	3.8	111	3.9
Mar. 3	Mar. 12	37	12	.32	2.1	5.8	.10	17	3.2	3.3	.0	28	38	1.9	2.9	84	4.8
Mar. 13	Mar. 23	280	89	.32	9.1	16	.30	14	2.8	4.3	.0	20	39	2.0	1.4	89	8.0
Mar. 24	Apr. 4	21	29	1.38	1.9	4.8	.06	30	7.4	4.4	.0	11	97	1.4	3.8	155	5.0
Apr. 5	Apr. 14	7	11	1.57	3.2	7.2	.09	31	4.2	10	.0	22	93	0.9	5.3	168	4.0
Apr. 15	Apr. 24	35	46	1.32	4.4	6.2	.12	18	3.8	9.9	.0	23	45	1.0	4.8	100	3.9
Apr. 25	May 4	21	40	1.90	5.8	11	.15	17	3.0	8.0	.0	26	36	.9	3.4	90	4.0
May 5	May 14	13	26	2.00	2.6	16	.10	17	3.2	7.7	.0	30	39	.8	2.9	101	4.8
May 15	May 24	11	20	1.82	3.0	6.2	.12	20	4.0	17	.0	43	45	.7	8.2	118	4.4
May 25	June 3	21	30	1.43	2.5	6.6	.14	17	3.0	26	.0	53	40	.6	14	134	4.2
June 4	June 14	20	31	1.55	4.6	8.4	.14	17	3.0	7.4	.0	25	41	1.1	2.4	91	4.2
June 15	June 24	10	22	2.20	1.4	7.0	.10	20	4.4	7.9	.0	25	51	1.0	4.1	107	3.9
June 25	July 5	3	25	8.33	.3	7.0	.06	32	6.8	10	[b]7.2	28	82	Tr.	6.0	166	3.8
July 6	July 15	3	15	5.00	2.6	8.8	.08	38	.....	......	[b]2.4	29	99	.6	6.2	186	3.9
July 16	July 25	35	42	1.20	7.9	5.0	.22	21	4.0	......	[b]9.6	9.0	41	.0	3.8	98	3.8
July 27	Aug. 5	15	32	2.13	3.5	4.2	.06	24	4.6	5.7	[b]8.4	13	50	Tr.	5.4	113	3.2
Aug. 6	Aug. 15	25	39	1.56	9.6	6.8	.11	.....	.....	12	.0	41	54	.2	7.4	132	2.6
Aug. 16	Aug. 25	40	145	3.63	8.8	7.4	.06	41	7.8	14	.0	48	91	1.0	12	197	2.3
Aug. 26	Sept. 4	8	14	1.75	2.1	......	.60	32	6.4	......	.0	72	57	.6	8.4	194	2.3
Sept. 5	Sept. 14	18	22	1.22	1.8	12	.09	42	.....	20	.0	61	95	.4	13	215	2.5
Mean		28	29	1.59	3.0	8.2	.14	24	4.6	9.0	.0	36	58	.9	6.4	130	....
Per ct. of anhydrous residue		....	....	....	....	6.4	[c].2	18.6	3.5	7.0	13.7	....	45.0	.7	4.9	....	....

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[a] Analyses September 11 to November 21, 1906, by R. B. Dole; November 22, 1906, to April 4, 1907, by R. B. Dole and M. G. Roberts; April 5 to July 5, 1907, by Chase Palmer, and M. G. Roberts; July 6 to September 14, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Raritan River at Bound Brook, N. J.[a]

[Parts per million, unless otherwise stated.]

Date. (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Sept. 10	Sept. 19	9	8.6	0.96	0.1	22	Tr.	14	5.0	10	0.0	65	10	0.8	4.6	102	1.4
Sept. 20	Sept. 29	155	88	.57	2.0	15	0.5	13	4.6	9.9	.0	57	12	1.9	4.6	93	1.6
Sept. 30	Oct. 9	42	39	.93	4.3	14	.20	12	4.4	7.4	.0	59	12	1.8	4.2	92	1.8
Oct. 10	Oct. 19	8	10	1.25	.2	15	.10	14	4.8	7.9	.0	58	13	1.8	5.3	89	1.4
Oct. 20	Oct. 29	32	38	1.19	1.4	23	.20	13	5.2	9.5	.0	56	10	1.7	6.0	97	1.9
Oct. 30	Nov. 8	13	16	1.23	.6	18	.09	12	5.0	7.4	.0	57	10	1.6	5.3	98	1.6
Nov. 9	Nov. 18	9	4.4	.49	.5	14	.14	12	5.6	7.6	.0	59	12	.3	5.0	85	1.6
Nov. 19	Nov. 29	12	19	1.58	.15	12	.08	11	5.2	7.9	.0	52	14	.6	4.9	80	2.0
Nov. 30	Dec. 9	6	6.6	1.10	.2	18	.09	13	5.4	7.6	.0	62	9.9	2.0	4.7	93	1.4
Dec. 10	Dec. 19	26	33	1.27	.9	20	.16	12	4.8	6.6	.0	50	13	1.9	4.6	88	2.1
Dec. 21	Dec. 30	28	41	1.47	1.0	14	.18	10	4.4	6.1	.0	39	11	3.0	4.6	79	2.0
Dec. 31	Jan. 9	37	45	1.22	1.4	14	.30	9.6	4.2	.....	.0	....	12	2.1	4.6	73	2.8
Jan. 10	Jan. 19	47	71	1.51	1.6	11	.17	9.2	2.8	.....	.0	34	13	.....	5.3	69	3.1
Jan. 30	Feb. 9	5	0.8	.16	.4	17	.10	9.6	3.8	7.2	.0	45	10	3.8	4.8	75	1.8
Feb. 10	Feb. 19	4	Tr.	......	.2	19	.08	11	5.2	9.4	.0	52	8.6	4.0	5.9	83	1.6
Feb. 20	Mar. 2	5	Tr.	......	.2	22	.09	12	5.0	7.7	.0	52	11	2.4	5.3	89	1.4
Mar. 3	Mar. 12	11	13	1.18	.8	22	.10	10	4.8	9.0	.0	45	13	3.0	4.8	82	2.1
Mar. 13	Mar. 22	80	118	1.48	3.3	21	.20	7.2	2.6	6.0	.0	30	11	2.1	4.1	69	4.9
Mar. 23	Apr. 1	7	9.2	1.30	.4	12	.09	8.2	4.0	6.3	.0	38	10	2.8	3.8	64	2.2
Apr. 2	Apr. 11	10	15	1.50	.4	17	.09	11	2.4	11	.0	43	11	3.0	3.7	76	1.9
Apr. 12	Apr. 21	5	4.2	.84	.2	20	.11	10	3.0	12	.0	44	11	2.9	3.8	81	1.8
Apr. 22	May 2	40	29	.72	.8	17	.21	10	3.4	9.8	.0	45	11	2.8	3.8	81	1.8
May 3	May 12	20	27	1.35	.7	26	.18	10	3.6	9.0	.0	44	12	2.7	3.6	90	2.2
May 13	May 22	45	52	1.16	1.6	24	.13	11	3.8	.....	.0	46	11	2.7	3.5	86	2.2
May 23	June 2	8	15	1.88	.3	11	.06	11	3.6	7.6	.0	52	8.9	2.3	3.6	74	1.8
June 3	June 12	18	17	.94	.6	8.2	.08	9.6	3.0	11	.0	47	10	2.3	3.8	67	1.7
June 13	June 21	5	8.4	1.68	.2	10	.08	13	4.4	8.4	.0	59	10	2.2	4.2	81	1.3
June 23	July 2	18	22	1.22	.3	8.0	.03	13	5.2	11	.0	67	11	1.7	4.6	88	1.3
July 3	July 12	130	133	1.02	4.7	20	.11	17	2.4	12	.0	57	14	.7	4.6	96	1.3
July 13	July 23	272	202	.74	7.0	9.6	.18	14	3.8	11	.0	50	15	.7	4.8	81	1.4
July 24	Aug 2	25	30	1.20	1.4	13	.05	17	1.8	12	.0	56	17	.4	5.4	92	1.1
Aug. 3	Aug. 12	8	15	1.88	.8	10	.05	18	.....	.....	.0	43	18	.3	4.8	88	1.1
Aug. 13	Aug. 23	7	13	1.86	.6	8.4	.07	18	.....	.....	.0	66	18	.4	5.8	93	1.0
Aug. 24	Sept. 3	45	29	.63	1.2	15	.16	17	1.2	12	.0	62	16	.9	5.4	97	1.4
Sept. 5	Sept. 12	120	79	.66	2.6	19	.7	16	1.6	14	.0	56	18	1.0	5.4	104	1.5
Mean............		37	36	1.16	1.2	16	.15	12	3.9	9.1	.0	51	12	1.9	4.7	85	....
Per ct. of anhydrous residue..		....	......	......	.....	18.8	[b] .3	14.1	4.6	10.7	29.6	....	14.1	2.3	5.5	....	....

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[a] Analyses September 9 to October 29, 1906, and from November 9 to November 29, 1906, by R. B. Dole; October 30 to November 8, 1906, and from November 30, 1906, to April 1, 1907, by R. B. Dole and M. G. Roberts; April 2 to July 2, 1907, by Chase Palmer and M. G. Roberts; July 3 to September 12, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Red River near Shreveport, La.[a]

[Parts per million, unless otherwise stated.]

Date. (1907-8).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Mar. 19	Mar. 28	820	780	0.95	.....	40	3.6	57	11	....	0.0	98	99	1.0	42	350	10.8
Mar. 29	Apr. 7	1,050	910	.87	.....	34	3.2	38	19	....	.0	122	67	.1	45	324	6.0
Apr. 8	Apr. 17	600	555	.92	.....	31	1.2	45	.....	48	.0	134	62	.5	58	348	6.0
Apr. 18	Apr. 28	750	......	.....	.....	28	3.4	38	.....	....	.0	117	76	.4	42	318	3.9
Apr. 29	May 8	900	784	.87	.....	25	3.0	39	.....	27	.0	119	71	.5	40	298	10.6
May 9	May 18	1,100	1,284	1.16	40	55	1.9	35	6.7	21	7.2	117	24	1.2	13	257	17.0
May 23	June 3	880	960	1.09	27	36	.88	36	5.8	30	2.4	110	39	1.0	26	236	18.0
June 4	June 13	1,160	1,589	1.37	38	57	.82	45	6.4	38	14	122	44	1.2	34	311	23.8
June 14	June 23	800	582	.73	22	28	.19	47	7.7	38	Tr.	130	52	.5	41	286	24.7
June 24	July 4	1,400	1,314	.94	35	25	.14	73	13	74	.0	150	128	.4	103	491	14.8
July 5	July 16	1,500	1,800	1.20	42	38	.56	78	15	74	9.6	74	165	Tr.	117	584	11.1
July 17	July 27	1,600	1,850	1.15	40	38	1.8	57	10	42	4.8	102	88	.5	76	377	10.8
July 28	Aug. 7	1,100	1,750	1.59	25	47	.52	91	19	90	8.4	165	162	.3	110	636	4.0
Aug. 8	Aug. 17	290	300	1.04	5.3	30	.22	120	28	101	14	176	240	.2	132	797	2.6
Aug. 19	Aug. 28	300	420	1.40	13	26	.58	122	30	125	6.0	190	247	.3	188	877	1.2
Aug. 29	Sept. 8	170	184	1.08	2.9	39	.24	152	39	172	8.4	278	300	Tr.	252	1,131	.2
Sept. 9	Sept. 18	125	134	1.07	2.7	40	.14	140	39	148	.0	305	271	.2	216	1,035	− .5
Sept. 19	Sept. 28	40	80	2.00	1.3	33	Tr.	221	55	436	.0	232	561	Tr.	700	2,198	−1.2
Sept. 30	Oct. 10	350	438	1.25	13	24	.10	154	47	230	Tr.	288	320	.3	339	1,311	− .4
Oct. 11	Oct. 22	2,800	3,925	1.40	160	9.2	.5	97	22	134	4.8	80	217	Tr.	205	761	6.3
Oct. 23	Nov. 2	1,600	1,200	.75	49	20	.14	135	32	194	Tr.	156	320	.5	292	1,087	1.0
Nov. 3	Nov. 12	300	254	.85	12	20	Tr.	125	26	131	12	212	228	.2	188	851	.2
Nov. 13	Nov. 23	1,600	1,550	.97	100	23	.15	126	30	197	7.2	152	282	.5	292	1.057	1.3
Nov. 25	Dec. 4	425	508	1.19	27	13	.52	42	8.3	40	12	85	62	Tr.	55	276	6.8
Dec. 5	Dec. 15	325	263	.81	15	18	.52	50	12	52	19	51	86	Tr.	71	346	4.9
Dec. 16	Dec. 25	400	447	1.12	13	20	.52	49	13	58	Tr.	111	86	.2	78	357	6.8
Dec. 26	Jan. 4	1,300	1,400	1.08	50	35	3.5	38	4.4	25	Tr.	112	38	.8	24	240	12.6
Jan. 5	Jan. 15	425	616	1.45	21	25	1.2	42	6.3	47	.0	93	71	.5	65	315	10.8
Jan. 16	Jan. 25	300	377	1.26	8.4	35	1.3	31	4.3	36	4.8	83	41	.0	42	248	9.6
Jan. 26	Feb. 4	200	194	.97	8.9	20	.47	46	5.6	53	Tr.	88	82	.4	82	350	6.0
Feb. 5	Feb. 15	240	279	1.16	8.2	15	.6	39	6.5	43	14	61	64	Tr.	55	273	7.6
Feb. 16	Feb. 29	960	1,065	1.11	12	38	2.8	34	4.9	25	7.2	93	39	.5	24	234	13.0
Mar. 1	Mar. 10	240	260	1.08	7.7	28	1.5	34	5.6	31	.0	95	52	.3	35	237	9.9
Mar. 11	Mar. 19	800	660	.82	16	33	2.4	37	5.9	32	Tr.	98	59	.2	38	277	8.9
Mean		790	870	1.11	.....	30	1.1	74	17	90	4.6	135	140	.4	121	561	.....
Per ct. of anhydrous residue		......	......	......	.....	5.5	[b] .3	13.6	3.1	16.5	13.1	....	25.7	.0	22.2	......	.....

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[a] Analyses March 19 to May 8, 1907, by James R. Evans; May 9 to March 19, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Rio Grande River at Laredo, Tex.[a]

[Parts per million, unless otherwise stated.]

Date. (1905-6).		Suspended matter.	Silica (SiO_2).	Oxides of iron and aluminum ($Fe_2O_3+Al_2O_3$).	Calcium (Ca).	Magnesium (Mg).	Sodium (Na).	Potassium (K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet,
From—	To—													
Aug. 1	Aug. 10	4,210	35	5.0	137	18	104	9.5	0.0	164	446	128	772	6.7
Aug. 11	Aug. 20	3,750	40	3.4	204	25	102	9.9	.0	159	267	143	1,090	7.1
Aug. 21	Aug. 30	3,196	33	3.0	117	14	118	7.2	.0	166	202	111	664	5.7
Aug. 31	Sept. 9	892	32	3.8	98	20	96	5.2	.0	178	185	144	676	4.8
Sept. 10	Sept. 20	4,964	31	2.4	104	19	65	4.9	.0	185	202	152	746	6.5
Sept. 21	Sept. 30	3,064	33	2.2	87	14	64	3.6	.0	165	164	77	540	6.6
Oct. 1	Oct. 10	2,872	33	2.6	67	10	51	5.2	.0	161	88	71	436	6.9
Oct. 11	Oct. 20	2,056	39	3.0	97	17	......	6.5	.0	178	138	134	600	5.3
Oct. 21	Oct. 30	722	36	4.6	98	20	104	9.6	.0	195	192	134	684	4.2
Oct. 31	Nov. 9	354	......	......	......	......	......	......	......	......	......	......	836	3.8
Nov. 10	Nov. 19	762	22	2.4	110	25	......	......	.0	190	233	203	864	4.6
Nov. 20	Nov. 29	1,222	27	3.2	76	15	......	......	.0	153	155	139	612	5.2
Nov. 30	Dec. 9	470	27	2.6	108	26	122	4.9	.0	176	252	182	904	4.9
Dec. 11	Dec. 19	1,772	28	2.0	107	23	98	12	.0	165	243	144	812	4.7
Dec. 20	Dec. 29	2,246	23	2.6	87	18	72	4.7	.0	......	191	113	612	5.4
Dec. 30	Jan. 8	696	24	3.2	92	20	97	4.5	.0	......	192	149	720	4.6
Jan. 9	Jan. 18	396	26	4.4	112	31	122	5.9	.0	212	268	201	956	4.0
Jan. 19	Jan. 28	212	30	3.6	149	35	153	6.0	.0	245	298	240	1,080	3.6
Jan. 29	Feb. 7	128	29	4.0	142	35	142	3.7	.0	185	330	241	1,112	3.5
Feb. 8	Feb. 17	358	17	4.6	130	34	118	3.1	.0	188	322	241	1,072	4.2
Feb. 18	Feb. 27	754	23	2.6	82	19	141	11	.0	126	192	82	668	5.1
Feb. 28	Mar. 9	562	25	1.0	83	22	103	5.4	.0	160	193	120	690	4.4
Mar. 10	Mar. 19	408	34	1.8	104	29	143	3.9	.0	......	254	......	916	3.6
Mar. 20	Mar. 29	270	33	4.0	112	34	147	......	[b]6.3	175	294	227	1,004	3.1
Mar. 30	Apr. 8	208	25	4.0	105	28	145	......	.0	169	297	265	1,054	2.9
Apr. 9	Apr. 18	396	35	4.0	107	38	190	......	.0	166	319	304	1,040	3.2
Apr. 19	Apr. 28	406	27	3.4	103	36	162	......	.0	159	310	292	1,072	3.0
Apr. 29	May 8	1,828	26	10.2	131	38	205	8.9	.0	255	309	346	1,304	4.3
May 9	May 18	5,826	31	6.2	151	31	131	5.9	.0	225	368	275	1,094	4.9
May 19	May 28	5,320	22	5.8	83	27	81	5.1	.0	204	168	121	580	5.0
May 29	June 7	3,446	35	3.2	85	20	89	4.4	.0	170	210	154	752	5.4
June 8	June 17	6,428	29	7.0	89	25	86	5.7	.0	172	193	115	654	4.6
June 18	June 2	5,310	26	3.4	97	20	137	10	.0	172	236	166	782	4.2
June 28	July 7	7,726	19	1.6	64	18	78	8.8	.0	157	146	105	524	4.8
July 8	July 17	6,734	21	2.4	68	12	65	6.8	.0	171	112	103	480	7.3
July 18	July 27	6,382	35	2.4	72	11	82	7.4	[b]13	150	116	74	466	8.4
July 28	Aug. 2	5,226	32	2.2	69	10	72	6.3	[b]6.3	147	118	50	410	9.5
Mean..........		2,475	29	3.6	104	23	112	6.6	.0	178	228	164	791	......
Per ct. of anhydrous residue..		......	3.8	.5	13.7	3.0	14.8	.9	11.6	......	30.1	21.6	......	......

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[a] Analyses by W. H. Heileman.

[b] Abnormal; computed as HCO_3 in the average.

Mineral analyses of water from Roanoke River at Randolph, Va.[a]

[Parts per million, unless otherwise stated.]

Date. (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—															
Sept. 7	Sept. 16	500	40	0.08	14	25	2.5	10	4.4	6.5	0.0	57	3.6	0.5	2.4	102
Sept. 17	Sept. 26	300	56	.19	14	24	1.5	8.8	2.8	6.9	.0	55	3.8	.3	2.6	90
Sept. 27	Oct. 4	270	328	1.22	15	16	1.2	9.0	3.2	6.3	.0	48	4.0	Tr.	1.9	74
Oct. 10	Oct. 25	290	282	.97	14	23	2.1	8.4	2.6	......	.0	45	3.0	.7	1.9	84
Oct. 26	Nov. 5	38	38	1.00	2.6	19	.4	11	4.4	6.6	.0	59	4.3	.5	2.2	76
Nov. 6	Nov. 17	21	21	1.00	1.2	22	.3	11	4.4	7.4	.0	61	4.9	.6	2.5	80
Nov. 18	Nov. 27	350	272	.78	15	23	1.3	8.8	3.8	7.2	.0	50	5.7	.9	1.9	82
Dec. 1	Dec. 15	17	19	1.12	1.4	29	.4	11	4.6	2.8	.0	61	4.4	.5	2.9	87
Dec. 16	Dec. 27	....	156	......	7.7	20	1.0	9.2	3.8	3.9	.0	50	4.3	.4	2.6	75
Dec. 28	Jan. 6	....	139	......	7.3	19	1.6	8.8	3.6	5.4	.0	56	4.1	.9	2.3	72
Jan. 7	Jan. 16	26	39	1.50	1.9	23	.6	9.4	3.8	2.5	.0	52	4.6	.6	2.4	69
Jan. 17	Jan. 26	23	23	1.00	2.1	25	.6	10	4.0	4.5	.0	54	4.6	.4	2.9	81
Jan. 27	Feb. 5	26	24	.92	2.3	18	.5	9.6	3.6	3.2	.0	51	4.1	.3	2.6	68
Feb. 6	Mar. 2	60	63	1.05	3.9	13	.5	9.4	2.8	4.4	.0	46	4.8	.3	2.2	62
Mar. 3	Mar. 12	....	192	......	7.7	25	1.0	8.8	3.2	7.2	.0	44	4.8	1.0	1.3	87
Mar. 13	Mar. 25	29	63	2.17	1.6	17	.19	8.4	2.6	7.1	[b]8.2	34	4.3	.0	1.7	65
Mar. 26	Apr. 4	65	77	1.18	2.1	13	.32	9.8	3.0	7.6	.0	51	4.8	.2	2.0	64
Apr. 5	Apr. 14	171	139	.81	6.5	24	1.0	9.6	3.2	7.6	.0	50	4.9	1.0	1.4	83
Apr. 19	Apr. 29	290	238	.82	18	28	1.0	10	3.4	7.2	.0	55	5.1	1.0	2.2	91
Apr. 30	May 12	400	327	.82	16	22	1.0	9.6	3.2	8.5	.0	58	4.1	.5	2.6	85
Mean		169	127	......	7.7	21	.95	9.5	3.5	5.9	.0	53	4.4	.5	2.2	79
Per ct. of anhydrous residue		....	....	......	......	28.2	[c]1.8	12.8	4.7	7.9	35.1	......	5.9	.7	3.0	.....

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[a] Analyses September 7 to November 27, 1906, by R. B. Dole; December 1, 1906, to April 4, 1907, by R. B. Dole and M. G. Roberts; April 5 to May 12, 1907, by Chase Palmer and M. G. Roberts.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from St. Lawrence River at Ogdensburg, N. Y.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).	Turbidity.	Suspended matter.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
Sept. 18	2	....	9.6	0.06	32	6.9	6.2	4.2	114	12	Tr.	7.7	135	244.93
Oct. 18	1	....	8.2	.03	32	6.5	6.7	3.7	115	12	Tr.	7.2	134	244.68
Nov. 18	5	....	3.7	.05	31	7.3	6.1	4.2	114	12	0.6	7.6	128	244.62
Dec. 24	2	....	6.6	.04	32	7.1	5.7	Tr.	123	13	.45	7.6	133	244.64
Jan. 18	3	....	6.6	.04	31	7.4	6.9	3.6	117	13	.25	7.8	135	245.20
Mar. 18	18	....	5.0	.05	31	7.3	5.4	Tr.	120	13	.25	7.7	128	245.42
Apr. 23	4	....	7.7	.05	30	7.7	7.3	2.5	116	12	.15	7.3	141	245.32
May 22	1	....	7.1	.06	30	7.6	6.8	4.0	113	12	.15	7.2	143	245.74
June 18	.....	....	3.9	.05	32	6.9	6.1	0.0	118	12	.8	7.9	130	246.05
July 20	.....	....	5.2	.03	32	7.4	5.8	4.4	112	14	.6	8.6	133	246.12
Aug. 18	.....	....	9.4	.04	32	7.3	6.1	4.8	111	12	.4	8.3	137	245.90
Mean	4.5	Tr.	6.6	.05	31	7.2	6.3	2.9	116	12	0.3	7.7	134	......
Per ct. of anhydrous residue	.....	....	5.0	[b] .1	23.6	5.5	4.8	45.7	......	9.2	0.2	5.9	.....	......

[a] Analyses by R. B. Dole and M. G. Roberts.
[b] Fe_2O_3.

Mineral analyses of water from Saluda River near Columbia, S. C.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).[b]	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).[c]	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[d]
Oct. 27	Nov. 5	70	35	0.50	23	1.0	6.3	0.8	.....	0.0	27	.....	0.3	4.0	63	1.4
Nov. 6	Nov. 16	95	30	.32	26	.8	4.2	Tr.	.....	.0	......	.....	.5	4.0	55	1.5
Nov. 17	Nov. 28	40	21	.52	23	.6	9.1	1.2	.....	.0	34	.....	.5	1.0	68	1.7
Nov. 29	Dec. 8	35	18	.51	20	.30	10	1.6	.....	.0	39	.....	.7	2.0	70	4.2
Dec. 9	Dec. 19	85	60	.71	20	.5	3.9	Tr.	.....	.0	......	.....	.8	2.2	48	5.2
Jan. 4	Jan. 15	25	17	.68	32	.20	11	2.0	.....	.0	44	.....	.5	2.5	80	5.6
Jan. 16	Jan. 25	45	34	.76	19	.40	12	2.4	.....	.0	44	.....	.5	2.5	66	3.6
Jan. 26	Feb. 4	60	46	.77	17	.20	8.4	1.2	.....	.0	29	.....	.3	5.0	60	3.8
Feb. 5	Feb. 14	70	55	.78	27	.30	7.2	.8	.....	.0	24	.....	.3	4.0	67	4.5
Feb. 15	Feb. 24	55	33	.60	15	.20	9.6	Tr.	.....	.0	29	.....	.1	3.5	50	3.2
Feb. 25	Mar. 14	65	48	.74	18	.20	10	1.2	.....	.0	34	.....	.5	4.5	62	3.6
Mar. 15	Mar. 24	45	40	.89	21	.10	9.6	1.6	.....	.0	34	.....	.4	3.0	64	2.1
Mar. 25	Apr. 3	18	17	.94	19	.10	10	1.2	.....	.0	34	.....	.4	4.5	60	2.0
Apr. 4	Apr. 13	15	12	.80	20	......	10	1.6	.....	.0	34	.....	.4	5.0	71	2.7
Apr. 14	Apr. 23	250	230	.92	20	.5	7.5	2.8	.....	.0	32	.....	.3	4.5	57	2.6
Apr. 24	May 3	185	166	.90	22	.30	6.0	2.4	.....	.0	24	.....	.4	4.0	55	5.2
Mean		72	54	.71	21	.38	8.4	1.3	[b] 6.0	.0	33	[c] 5.0	.43	3.5	62	....
Per ct. of anhydrous residue[e]		....	....	......	33.6	[f] .9	13.5	2.1	9.6	26.0	......	8.0	.7	5.6	....	....

[a] Analyses by J. R. Evans.
[b] Fluctuates between 1 and 10 parts; average value about 6 parts.
[c] Fluctuates between trace and 10 parts; average value about 5 parts.
[d] Gaging station at Chappells, S. C., 50 miles above.
[e] Approximate.
[f] Fe_2O_3.

Mineral analyses of water from Savannah River near Augusta, Ga.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 25	Nov. 3	45	33	0.73	.....	21	.....	5.4	1.2	.....	0.0	27	.....	0.1	2.0	56	9.6
Nov. 4	Nov. 13	40	17	.42	.....	28	0.20	6.2	Tr.	.....	.0	24	.....	.6	2.0	77	9.0
Nov. 14	Nov. 23	35	12	.34	.....	32	.30	4.4	Tr.	.....	.0	17	.....	.7	1.5	59	10.4
Nov. 24	Dec. 3	40	17	.42	.....	32	.20	4.9	Tr.	.....	.0	20	.....	.8	1.5	64	9.2
Dec. 4	Dec. 13	55	20	.36	.....	34	.30	6.4	3.2	.....	.0	22	.....	.6	1.8	74	9.6
Dec. 14	Dec. 23	65	22	.34	.....	31	.30	6.2	2.8	.....	.0	22	.....	.5	2.0	72	10.8
Dec. 24	Jan. 2	85	55	.65	.....	36	.40	3.9	Tr.	.....	.0	15	.....	.3	2.0	78	11.0
Jan. 3	Jan. 12	60	46	.77	.....	24	.7	3.9	1.6	.....	.0	17	.....	.8	2.5	54	11.2
Jan. 13	Jan. 22	16	10	.62	.....	17	.40	6.0	4.8	.....	.0	27	.....	.8	2.0	60	9.3
Jan. 23	Feb. 2	60	41	.68	.....	30	.40	8.2	2.8	.....	.0	34	.....	.4	3.5	70	9.3
Feb. 3	Feb. 12	150	127	.85	.....	23	.7	5.4	.8	.....	.0	20	.....	.9	3.0	53	14.2
Feb. 13	Feb. 22	20	17	.85	.....	13	1.2	7.6	1.2	.....	.0	24	.....	.6	3.0	52	9.2
Mar. 13	Mar. 22	22	15	.68	.....	12	.9	5.6	Tr.	.....	.0	20	.....	.6	2.8	42	9.4
Mar. 23	Apr. 1	15	14	.93	.....	20	.9	8.4	Tr.	.....	.0	27	.....	.5	3.0	55	8.4
Apr. 2	Apr. 11	45	42	.93	.....	23	1.2	8.4	Tr.	.....	.0	27	.....	.3	2.5	59	8.5
Apr. 12	Apr. 21	210	205	.98	.....	26	1.4	7.6	Tr.	.....	.0	24	.....	.3	1.5	52	8.4
Apr. 22	May 1	340	316	.93	.....	20	1.6	5.5	Tr.	.....	.0	19	.....	.4	3.0	42	11.6
May 2	May 11	265	248	.94	.....	17	1.8	7.2	1.6	.....	.0	24	.....	.2	3.0	45	9.5
May 12	May 22	45	38	.84	3.2	37	.22	5.9	.4	13	.0	50	5.5	.8	1.7	90	8.3
May 23	June 1	130	142	1.09	5.2	31	.20	5.2	.4	13	[b]9.6	27	5.7	.7	1.8	78	8.3
June 2	June 11	175	259	1.65	14	21	.54	4.9	.4	11	[b]7.2	17	6.1	.7	1.4	61	9.8
June 12	June 21	300	231	.77	9.6	17	.08	5.1	.2	12	[b]Tr.	35	5.6	1.1	1.4	51	8.2
June 22	July 3	425	338	.79	14	15	.06	5.1	.4	11	[b]Tr.	37	5.8	1.6	1.6	54	8.8
July 4	July 13	315	255	.81	9.4	25	.20	5.0	.7	12	[b]7.2	24	5.5	.2	1.4	67	7.7
July 14	July 23	425	446	1.05	18	30	.26	5.0	.....	12	[b]14	9.8	7.3	.9	1.2	76	8.4
July 24	Aug. 3	400	419	1.05	14	14	.04	4.7	.4	13	[b]9.6	22	7.4	.0	Tr.	53	7.6
Aug. 4	Aug. 13	575	424	.74	46	15	Tr.	5.1	.6	11	.0	32	6.8	3.0	1.8	53	7.4
Aug. 14	Aug. 23	475	318	.67	28	16	.04	5.1	.5	10	[b]3.6	30	6.7	.3	1.7	56	9.5
Aug. 24	Sept. 2	160	75	.47	7.9	22	Tr.	5.0	.5	13	.0	40	6.0	1.0	2.0	63	6.5
Sept. 3	Sept. 12	270	159	.59	11	18	.04	5.0	.4	11	.0	34	5.3	1.0	2.2	58	6.8
Sept. 13	Sept. 22	200	72	.36	9.3	19	.00	6.0	.5	12	.0	40	5.8	.7	2.2	64	6.1
Sept. 23	Oct. 2	300	299	1.00	21	14	.04	6.0	.3	9.2	.0	33	4.9	.0	1.6	49	10.9
Oct. 3	Oct. 12	65	59	.91	5.6	16	Tr.	4.6	.4	9.6	.0	32	4.7	.7	1.9	53	6.3
Oct. 13	Oct. 22	25	25	1.00	2.4	21	.00	5.3	.5	11	[b]2.4	32	6.0	.0	1.8	61	5.3
Mean		172	142	.77	.....	23	.44	5.7	.8	12	.0	30	6.0	.6	2.1	60	.....
Per ct. of anhydrous residue		....	....	.....	.....	35.0	[c].9	8.7	1.2	18.3	22.6	.....	9.1	1.0	3.2	....	.....

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[a] Analyses October 25, 1906, to May 11, 1907, by J. R. Evans; May 12 to October 22, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Shenandoah River at Millville, W. Va.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Sept. 12	Sept. 21	17	18	1.06	0.3	16	Tr.	35	11	5.0	0.0	156	3.6	2.1	2.6	149	1.4
Sept. 22	Oct. 1	12	11	.92	.2	12	0.10	35	12	6.2	.0	160	3.4	2.0	3.2	150	1.3
Oct. 2	Oct. 11	42	30	.71	.8	19	.05	33	9.4	5.8	.0	142	5.1	2.6	3.0	146	2.2
Oct. 12	Oct. 21	80	69	.86	2.1	20	.20	28	8.0	6.0	.0	118	6.1	2.1	2.4	131	3.9
Oct. 22	Oct. 31	90	108	1.20	2.6	20	.20	28	7.4	5.8	.0	116	4.6	3.4	2.4	131	4.6
Nov. 1	Nov. 10	9	7	.78	Tr.	19	Tr.	38	6.8	5.7	Tr.	163	6.1	3.0	2.4	162	2.2
Nov. 11	Nov. 20	9	10	1.11	.1	16	.05	42	7.6	4.9	6.0	161	5.8	3.0	2.4	172	1.8
Nov. 21	Nov. 30	37	32	.86	1.4	14	.20	29	7.2	5.2	Tr.	122	6.5	3.0	2.6	126	2.9
Dec. 1	Dec. 10	7	5.0	.71	.1	16	.05	37	9.8	5.5	6.0	147	7.1	3.2	2.6	155	1.7
Dec. 11	Dec. 20	25	27	1.08	.3	19	.06	36	11	5.7	.0	155	5.9	3.2	2.6	157	2.4
Dec. 21	Dec. 30	27	21	.78	.5	13	.16	30	8.0	3.2	Tr.	120	5.4	3.5	2.2	124	2.7
Dec. 31	Jan. 10	28	23	.82	1.0	12	.14	30	7.4	4.3	.0	120	5.9	3.0	2.6	126	2.9
Jan. 11	Jan. 20	27	26	.96	.9	14	.10	32	7.6	4.1	.0	129	6.6	3.0	2.8	136	3.1
Jan. 21	Jan. 30	28	31	1.11	1.1	11	.12	31	7.0	3.3	.0	120	4.8	3.0	2.4	123	3.2
Jan. 31	Feb. 9	10	11	1.10	.4	10	.08	.....	10	4.1	.0	144	5.8	3.2	3.0	151	2.2
Feb. 10	Feb. 19	9	12	1.33	.5	14	.06	36	9.4	4.9	5.8	137	8.1	3.6	3.4	148	2.5
Feb. 20	Feb. 28	11	11	1.00	.4	17	.07	36	9.0	5.4	.0	145	7.1	4.2	3.0	150	2.2
Mar. 2	Mar. 11	....	203	.....	3.7	16	.13	34	8.4	4.9	.0	142	6.9	4.3	2.9	146	2.5
Mar. 12	Mar. 21	75	71	.95	1.5	10	.16	31	7.4	4.7	.0	127	5.3	4.1	2.9	126	3.3
Mar. 22	Mar. 31	19	16	.84	.5	16	.05	30	7.8	4.7	2.4	122	6.1	3.7	2.3	132	2.4
Apr. 1	Apr. 10	11	11	1.00	1.1	20	.07	35	9.6	9.1	.0	.....	6.6	3.7	2.2	154	....
Apr. 11	Apr. 20	75	78	1.04	2.1	26	.13	28	6.4	5.8	4.8	107	5.9	3.4	3.8	138	....
Apr. 21	Apr. 30	4	8.0	2.00	.2	20	.07	31	7.6	6.0	4.8	110	5.6	2.0	4.2	138	....
May 1	May 11	5	10	2.00	.3	18	.06	32	8.0	6.9	3.6	116	5.9	2.6	3.8	137	....
May 12	May 21	3	8.5	2.83	.3	16	.05	28	7.8	8.5	.0	122	6.1	1.7	3.0	134	....
May 22	May 31	9	13	1.44	.4	12	.06	31	7.6	.....	.0	123	4.9	2.3	3.0	134	....
June 1	June 10	150	161	1.08	4.0	14	.06	24	5.4	6.3	.0	102	5.8	2.0	3.0	112	....
June 11	June 20	85	115	1.35	1.9	11	.08	14	5.4	5.4	.0	71	5.3	Tr.	1.8	78	....
June 21	June 30	2	19	9.50	.3	14	.08	32	9.2	6.6	2.4	127	4.9	1.8	3.6	139	....
July 1	July 10	15	64	4.26	.5	14	.05	26	5.6	13	4.8	108	7.9	1.3	2.6	122	1.8
July 11	July 20	7	24	3.43	.2	11	.04	36	.....	11	4.8	142	8.1	1.5	3.0	149	1.5
July 21	July 31	5	16	3.20	.2	11	.03	37	9.8	12	.0	159	8.7	2.0	4.2	158	1.4
Aug. 1	Aug. 10	38	35	.92	.6	8.6	.03	35	.....	8.8	.0	149	8.4	1.0	3.8	145	1.1
Aug. 11	Aug. 20	4	14	3.50	.3	8.6	.03	37	.....	9.0	.0	152	8.1	2.1	3.4	152	1.3
Aug. 21	Aug. 30	20	18	.90	.4	13	.05	38	7.8	12	2.4	149	7.9	2.4	3.8	158	1.4
Aug. 31	Sept. 9	80	58	.72	1.6	15	.06	37	7.4	13	.0	149	7.9	2.1	6.6	160	1.3
Mean		31	39	1.64	.9	15	.08	32	8.2	6.7	1.3	132	6.2	2.6	3.0	140	....
Per ct. of anhydrous residue		....	.....	.....	.....	10.7	[b] .1	22.8	5.9	4.8	47.3	.....	4.4	1.9	2.1	.....	....

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[a] Analyses September 12 to December 10, 1906, by R. B. Dole; December 11, 1906, to March 31, 1907, by R. B. Dole and M. G. Roberts; April 1 to June 30, 1907, by Chase Palmer and M. G. Roberts; July 1 to September 9, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O

Mineral analyses of water from Lake Superior at Sault Ste. Marie, Mich.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).	Turbidity.	Suspended matter.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Sept. 22	2	....	11	0.09	13	3.2	3.9	0.0	59	4.1	0.25	1.0	63	602.95
Oct. 22	1	....	8.7	.03	13	3.1	3.5	.0	56	3.8	.25	1.2	61	602.84
Nov. 22	2	....	5.9	.04	13	2.9	2.0	.0	54	1.8	.45	1.4	54	602.66
Dec. 20	Tr.	....	7.2	.08	13	2.9	3.6	.0	55	1.8	.30	1.3	58	602.45
Jan. 22	Tr.	....	4.7	.03	13	2.9	2.0	.0	55	1.6	.45	1.2	53	602.22
Mar. 22	3	....	12	.04	13	3.2	5.1	.0	55	1.7	.35	1.1	68	602.06
Apr. 20	1	....	12	.11	13	3.1	3.5	.0	56	1.5	.30	1.0	64	601.94
May 23	3	....	4.8	.09	13	3.0	3.0	.0	52	1.5	.55	1.0	57	602.10
June 22	3	....	4.6	.04	14	3.2	3.3	.0	59	1.7	1.2	1.2	59	602.55
July 22	2	....	5.7	.05	12	3.0	2.8	.0	58	1.5	1.2	1.0	55	602.70
Aug. 22	5	....	5.3	.05	13	3.1	2.9	.0	60	1.6	.50	1.1	66	602.93
Mean	2	Tr.	7.4	.06	13	3.1	3.2	.0	56	2.1	.5	1.1	60	....
Per ct. of anhydrous residue	....	....	12.7	c.2	22.4	5.3	5.5	47.5	.....	3.6	.9	1.9	.....	....

[a] Analyses by R. B. Dole and M. G. Roberts.

[b] Gaging station at Marquette, Mich., 160 miles west.

[c] Fe_2O_3.

Mineral analyses of water from Susquehanna River at West Pittston, Pa.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Oct. 28	Nov. 7	5	3.8	0.76	0.3	12	0.04	15	2.4	4.1	0.0	61	8.2	0.3	3.1	79	5.11
Nov. 8	Nov. 16	3	0.6	.20	1.0	10	.03	16	3.0	4.7	.0	62	8.1	.4	3.0	77	4.24
Nov. 28	Dec. 7	8	8 2	1.02	.4	8.4	.03	15	2.8	4.4	.0	56	8.5	1.0	2.0	72	5.33
Dec. 8	Dec. 17	37	41	1.11	1.4	10	.13	16	2.0	6.5	.0	58	12	3.0	4.1	79	8.11
Dec. 19	Dec. 28	12	18	1.50	.9	8.4	.14	16	1.6	6.5	.0	58	11	2.0	4.1	76	6.80
Dec. 29	Jan. 7	150	145	.97	5.1	10	.21	12	1.4	6.6	.0	47	10	3.0	3.6	68	11.50
Jan. 8	Jan. 18	27	42	1.55	1.5	10	.19	13	1.6	5.0	.0	38	15	3.6	3.6	70	10.10
Jan. 19	Jan. 29	21	34	1.62	1.5	8.0	.16	14	1.6	5.5	.0	46	13	3.0	3.4	69	10.10
Jan. 30	Feb. 10	2	4.6	2.30	.6	8.8	.14	19	2.4	5.4	.0	54	18	6.0	4.6	89	8.20
Feb. 11	Feb. 20	2	2.8	1.40	.3	16	.10	20	2.6	6.6	.0	72	13	4.0	4.6	95	5.60
Feb. 21	Mar. 3	2	5.8	2.90	.4	8 2	.12	22	3.2	7.4	[c] 2.9	81	12	2.2	5 0	100	4.10
Mar. 4	Mar. 13	2	4.2	2.10	.7	9.0	.10	.....	3.2	.....	.0	83	12	3.2	5.9	103	3.40
Mar. 14	Mar. 23	65	59	.91	2.6	12	.13	12	2.6	6.8	7.2	25	10	2.6	2.2	69	10.90
Mar. 24	Apr. 2	33	33	1.00	1.8	5.4	.13	10	2.0	.....	.0	26	11	1.6	1.4	50	11.80
Apr. 3	Apr. 14	8	20	2.50	.9	12	.21	16	2.2	6.8	.0	56	9.2	2 0	3.6	82	6.40
Apr. 15	Apr. 24	....	4.2	......	.4	14	.19	21	3.4	6.3	.0	....	17	2.0	4 2	98	6 10
Apr. 25	May 4	43	77	1.79	1.5	15	.22	24	3.9	5.8	.0	....	18	1.5	4 8	102	10.40
May 5	May 14	1	10	10.00	.5	18	.15	26	6.0	9.0	.0	96	18	1.7	4 2	134	7.50
May 15	May 24	2	20	10.00	.3	9.2	.29	12	4.2	9.0	[c] 4.8	36	18	.0	5 0	80	5 60
May 25	June 3	2	15	7.50	.3	6.4	.15	.....	4.2	9.1	[c] 4.8	35	19	Tr.	5 0	82	4.70
June 4	June 13	3	36	12.00	.4	12	.27	14	4.2	8.2	[c] 4.8	43	20	Tr.	5.0	91	4.80
June 14	June 23	1	18	18 00	.2	10	.17	12	4.2	7.1	[c] 12	27	17	Tr.	5.0	80	3.60
June 24	July 3	2	27	13.50	.3	3.4	.06	14	4 6	11	.0	54	20	Tr.	7.0	86	3.60
July 4	July 13	Tr.	3.0	......	.....	23	.05	26	5.8	11	.0	98	21	.8	6.6	148	4.00
July 14	July 24	Tr.	6.2	......	.....	14	.06	27	6.2	3.8	.0	....	17	1.0	4.6	117	4 00
July 25	Aug. 4	Tr.	5.4	......	.....	7.8	.06	26	4.4	3 5	.0	82	14	.8	4.6	108	3.30
Aug. 5	Aug. 15	Tr.	3.4	......	.....	9.0	.05	24	4 8	4 6	.0	85	11	.8	4.6	106	2.70
Aug. 16	Aug. 25	Tr.	3.2	......	.....	5.4	.05	25	6.6	3.3	.0	85	11	.4	4.6	100	2.40
Aug. 27	Sept. 6	8	11	1.38	.....	14	.11	26	2.9	9.1	.0	95	12	.3	5.4	120	2.30
Sept. 7	Sept. 16	18	19	1.06	.....	8.4	.15	20	4.0	3.5	.0	66	13	.3	4.6	91	5.00
Sept. 17	Sept. 26	Tr.	7.0	......	.....	8.0	.06	17	3.0	5 5	.0	61	14	1.0	2 2	85	4.10
Sept. 27	Oct. 9	5	7.6	1.52	.3	13	.06	20	1.8	.....	.0	67	12	Tr.	3.6	97	4.90
Oct. 10	Oct. 22	3	16	5.33	.7	4.0	.06	17	2.9	1.9	.0	55	9.7	.5	2.4	71	6.30
Mean		14	22	4 00	1.0	10	.12	18	3.4	6.3	.0	63	14	1.5	4.2	90	.....
Per ct. of anhydrous residue		....	......	......	.....	11.3	[d] .2	20.4	3.8	7.1	35.0	....	15.8	1.7	4.7	....	.....

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[a] Analyses October 28, 1906, to April 2, 1907, by R. B. Dole and M. G. Roberts; April 3 to July 3, 1907, by Chase Palmer and M. G. Roberts; July 4 to October 22, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station at Wilkes-Barre, Pa., 10 miles above.

[c] Abnormal; computed as HCO_3, in the average.

[d] Fe_2O_3.

Mineral analyses of water from Susquehanna River at Williamsport, Pa.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Sept. 21	Sept. 30	8	8.0	1.00	0.1	7.6	0.10	17.0	4.6	9.9	0.0	40	41	0.5	5.4	110	0.93
Oct. 1	Oct. 10	7	7	1.00	.3	5.2	.10	17	6.2	8.0	.0	38	42	.9	2.0	123	1.14
Oct. 11	Oct. 21	13	16	1.23	.3	9.0	Tr.	14	3.0	7.6	.0	33	34	.6	4.6	97	1.86
Oct. 22	Oct. 31	9	11	1.22	.1	13	Tr.	8.4	1.8	6.0	.0	30	17	.4	2.6	68	3.15
Nov. 1	Nov. 10	5	4.2	.84	.4	5.4	.13	10	2.2	7.7	.0	24	23	.5	3.4	63	2.03
Nov. 11	Nov. 21	6	3.0	.50	.4	5.4	.16	11	3.0	.....	.0	27	21	.5	3.5	66	1.86
Nov. 22	Dec. 2	8	7.2	.90	.6	5.2	.11	8.0	1.8	.....	.0	20	17	.6	2.6	52	3.06
Dec. 3	Dec. 12	14	21	1.50	1.3	5.6	.14	8.4	2.0	6.9	.0	17	18	.6	2.9	55	3.22
Dec. 13	Dec. 22	12	10	.83	1.0	6.2	.15	7.8	2.4	4.9	.0	14	19	1.3	3.4	50	3.63
Dec. 23	Jan. 1	11	21	1.90	.8	6.2	.11	8.4	2.4	5.4	.0	18	20	1.5	3.4	55	2.99
Jan. 2	Jan. 11	19	34	1.79	2.1	6.2	.12	6.2	1.8	4.6	.0	15	16	1.9	2.9	45	6.78
Jan 22	Feb. 1	7	13	1.85	.6	5.8	.11	8.8	2.4	3.8	.0	15	18	1.4	2.4	49	4.96
Feb. 2	Feb. 11	1	0.8	.80	.2	4.0	.06	11	3.2	3.9	.0	18	27	1.8	4.1	62	2.79
Feb. 12	Feb. 21	4	1.8	.45	.5	6.2	.09	13	3.6	5.7	.0	20	32	1.6	4.7	73	2.27
Feb. 22	Mar. 3	2	0.8	.40	.3	5.8	.10	14	3.8	5.5	.0	22	34	1.6	5.0	79	1.80
Mar. 4	Mar. 13	3	1.5	.50	.4	5.2	.19	14	4.0	6.0	.0	22	32	1.6	5.8	78	2.09
Mar. 14	Mar. 23	95	170	1.79	7.2	13	.25	9.6	1.8	5.5	.....	....	18	.9	1.7	55	10.89
Mar. 24	Apr. 3	13	35	2.69	1.0	14	.12	10	2.2	8.4	.....	....	13	.4	7.7	69	7.20
Apr. 4	Apr. 13	12	9.2	.77	.6	8.0	.13	8.2	2.2	8.2	.....	....	19	Tr.	3.4	52	3.37
Apr. 14	Apr. 23	1	3.4	.34	.5	9.4	.17	9.0	2.1	8.8	.....	....	20	1.2	3.4	62	2.64
Apr. 24	May 3	4	16	.40	1.0	16	.15	6.6	1.6	7.4	.....	....	14	1.0	2.4	54	5.02
May 4	May 13	1	14	14.00	.9	7.4	.14	6.6	1.5	4.9	.....	....	14	Tr.	2.4	41	4.67
May 14	May 23	3	13	4.33	.6	18	.12	7.5	1.7	7.7	.....	....	16	Tr.	2.4	64	3.32
May 24	June 2	Tr.	4.6	......	.2	4.6	.12	9.6	2.2	.....	.....	....	21	Tr.	2.4	55	2.22
June 3	June 12	9	29	3.22	1.4	3.6	.11	7.1	1.7	.....	.0	19	15	Tr.	2.2	44	4.60
June 13	June 23	1	12	12.00	.5	9.8	.12	9.0	2.2	7.4	.....	....	20	Tr.	2.4	62	2.65
June 24	July 3	78	78	1.00	2.2	12	.12	11	2.0	.....	[b]4.8	16	19	Tr.	3.6	73	3.72
July 4	July 13	8	15	1.88	.....	8.0	.06	8.7	3.4	2.6	.0	23	18	.6	2.2	57	2.98
July 14	July 23	4	15	3.75	.....	6.8	.11	13	4.5	2.2	.0	29	26	.2	3.4	72	1.61
July 24	Aug. 2	Tr.	14	......	.....	2.8	.15	17	4.9	2.5	.0	26	37	Tr.	4.2	81	1.04
Aug. 3	Aug. 12	Tr.	10	......	.....	3.8	.12	17	5.4	2.8	.0	32	37	.2	4.8	93	.67
Aug. 13	Aug. 22	3	13	4.33	.....	5.6	.13	19	7.1	5.3	.0	40	45	.2	6.0	111	.50
Aug. 23	Sept. 1	Tr.	5.2	......	.....	5.4	.16	22	7.9	6.0	.0	55	39	1.0	6.6	117	.36
Sept. 2	Sept. 11	Tr.	4.6	......	.....	8.6	.14	23	7.9	6.6	.0	55	42	.9	6.2	128	.58
Sept. 12	Sept. 21	2	......	......	.....	5.8	.05	22	6.4	5.8	.0	38	51	.0	7.8	122	1.19
Sept. 22	Oct. 2	4	4.4	1.10	.3	11	.08	24	5.4	7.7	.0	44	....	1.1	7.2	120	1.20
Oct. 3	Oct. 11	8	7.0	.88	.6	5.6	.06	17	3.6	.....	.0	....	38	.5	6.2	90	2.03
Mean		10	18	2.23	.9	7.6	.11	12	3.4	6.0	.0	28	26	.7	4.0	74	.....
Per ct. of anhydrous residue		....	......	......	.....	10.3	[c].2	16.3	4.6	8.1	18.8	....	35.3	1.0	5.4	....	.....

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[a] Analyses September 21 to October 31, 1906, by R. B. Dole; November 1, 1906, to March 13, 1907, by R. B. Dole and M. G. Roberts; March 14 to April 3, 1907, by M. G. Roberts; April 4 to July 3, 1907, by Chase Palmer and M. G. Roberts; July 4 to October 11, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Susquehanna River at Danville, Pa.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Sept. 10	Sept. 20	3	.....	.....	.....	15.0	0.30	.....	.....	7.2	0.0	48	39	0.2	4.2	124	2.50
Sept. 21	Sept. 30	4	1.6	0.40	Tr.	14	Tr.	22.0	6.2	11	.0	55	53	.8	4.9	141	2.40
Oct. 1	Oct. 10	22	18	.82	0.4	8.2	Tr.	.....	5.0	8.7	.0	48	35	.4	4.3	105	2.79
Oct. 11	Oct. 20	5	6	1.20	.1	6.4	Tr.	18	5.2	8.2	.0	47	28	1.5	5.0	98	2.90
Oct. 21	Oct. 31	29	61	2.10	2.3	7.0	.05	18	5.6	8.0	.0	67	17	1.3	4.8	98	5.01
Nov. 1	Nov. 10	8	8.0	1.00	.3	6.0	.06	13	2.6	6.6	.0	45	15	.0	3.1	73	4.71
Nov. 11	Nov. 20	9	7.8	.87	.3	6.0	.05	16	3.4	7.2	.0	56	22	Tr.	4.7	88	3.95
Nov. 21	Nov. 30	19	40	2.10	1.8	3.8	.18	12	2.8	6.5	.0	41	13	.3	2.2	64	6.12
Dec. 1	Dec. 10	13	14	1.08	.6	7.6	.09	17	4.0	8.4	.0	51	24	2.6	5.8	92	5.25
Dec. 11	Dec. 21	19	21	1.10	1.0	9.6	.10	15	3.6	8.2	.0	50	20	2.6	5.3	86	5.75
Dec. 23	Jan. 1	22	23	1.04	.8	14	.10	19	5.4	9.4	.0	52	25	5.6	8.6	112	4.83
Jan. 2	Jan. 11	53	80	1.51	2.1	6.4	.19	9.4	3.0	4.7	.0	28	13	2.0	2.3	55	10.52
Jan. 12	Jan. 21	41	18	.44	1.5	15	.26	15	4.0	16	[b]14	40	22	3.0	5.8	121	7.14
Jan. 22	Jan. 31	8	13	1.63	.9	23	.10	30	....	9.8	.0	76	42	11	16	178	6.10
Feb. 1	Feb. 11	12	2.2	.18	.7	8.0	.06	27	6.0	10	.0	68	39	7.2	12	140	3.94
Feb. 13	Feb. 22	15	4.4	.29	.7	5.2	.06	32	7.2	12	[b] 4.8	67	40	7.2	13	152	3.28
Feb. 23	Mar. 4	6	2.2	.37	.3	11	.06	25	6.4	8.0	.0	61	41	3.6	6.5	134	.....
Mar. 5	Mar. 14	30	30	1.00	1.0	9.0	.05	26	6.4	12	.0	66	42	7.0	9.8	142	4.38
Mar. 15	Mar. 24	55	71	1.29	3.0	15	.15	6.4	1.4	4.9	.0	24	10	1.9	2.4	56	9.70
Mar. 25	Apr. 3	19	26	1.37	1.4	6.4	.12	11	2.2	5.4	.0	34	14	2.0	3.4	62	9.24
Apr. 4	Apr. 13	10	12	1.20	.5	6.0	.08	20	2.8	9.8	[b] 3.4	43	22	5.3	10	104	5.26
Apr. 14	Apr. 23	11	13	1.18	.6	12	.08	19	2.2	11	[b] Tr.	44	22	5.2	9.4	99	5.18
Apr. 24	May 3	42	54	1.28	1.9	12	.13	12	1.0	8.2	.0	43	14	3.1	5.3	76	7.82
May 4	May 13	18	19	1.06	.8	12	.10	18	1.4	8.0	.0	48	18	3.0	7.0	95	6.37
May 14	May 23	8	9.4	1.18	.5	9.6	.06	19	1.6	13	.0	58	20	6.1	9.6	108	4.95
May 24	June 2	40	43	1.08	1.0	13	.18	22	1.6	12	.0	65	21	5.1	9.4	120	4.10
June 3	June 12	3	5.2	1.73	.3	7.2	.03	19	1.2	8.8	.0	48	21	6.2	11	100	4.36
June 13	June 22	3	5.2	1.73	.2	6.2	.05	25	4.0	13	.0	65	30	6.2	14	138	3.41
June 23	July 2	40	39	.97	.4	4.0	.03	23	5.6	5.7	.0	....	32	3.7	12	126	3.19
July 3	July 12	8	34	4.25	.8	6.0	.06	21	4.8	7.9	.0	51	31	2.8	10	116	3.86
July 13	July 23	8	21	2.62	.5	4.2	.06	23	5.6	5.2	.0	55	32	1.8	10	121	3.63
July 24	Aug. 2	1	16	16.00	.3	4.8	.06	22	5.0	9.9	[b] 6.0	41	37	1.8	11	122	3.08
Aug. 3	Aug. 12	Tr.	4.8	.....	.2	4.0	.05	28	6.8	9.0	.0	60	47	3.0	11	143	2.59
Aug. 13	Aug. 22	Tr.	4.6	.....	.2	4.0	.05	32	9.8	7.7	.0	62	63	3.0	13	170	2.24
Aug. 23	Sept. 1	Tr.	9.0	.....	.1	2.8	.04	34	10	11	[b] 6.0	50	71	2.9	13	177	2.12
Sept. 2	Sept. 11	7	10	1.43	.4	.....	.12	35	11	9.0	.0	79	71	2.9	11	....	2.52
Mean		16	21	1.73	.8	8.7	.09	21	4.6	8.9	.0	54	31	3.4	8.1	112	.....
Per ct. of anhydrous residue		....	......	.....	.....	7.7	[c].1	18.7	4.1	7.9	23.7	....	27.6	3.0	7.2	....	....

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[a] Analyses September 10 to November 30, 1906, by R. B. Dole; December 1, 1906, to April 3, 1907, by R. B. Dole and M. G. Roberts; April 4 to July 2, 1907, by Chase Palmer and M. G. Roberts; July 3 to September 11, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Tennessee River near Knoxville, Tenn.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 26	Nov. 4	48	21	0.44	.....	18	0.40	26	1.6	.....	0.0	83	.....	0.2	6.0	111	2.5
Nov. 5	Nov. 14	75	28	.37	.....	26	.6	18	.....	.....	.0	59	.....	.8	......	93	1.9
Nov. 15	Nov. 24	280	212	.76	.....	29	.8	20	3.6	.....	.0	77	.....	.2	12	128	8.4
Nov. 25	Dec. 4	300	194	.65	.....	26	.9	22	4.0	.....	.0	78	.....	.3	12	124	3.4
Dec. 5	Dec. 15	215	173	.81	.....	30	.7	23	2.8	.....	.0	93	.....	.3	10	131	2.4
Dec. 16	Dec. 30	105	79	.75	.....	24	.10	21	2.8	.....	.0	73	.....	.7	18	136	4.2
Dec. 31	Jan. 9	80	64	.80	.....	25	.30	21	1.2	.....	.0	66	.....	.9	7.0	105	5.8
Jan. 10	Jan. 19	25	16	.64	.....	28	.20	20	1.2	.....	.0	68	.....	1.0	10	118	2.8
Jan. 20	Jan. 29	25	15	.60	.....	13	.20	20	2.0	.....	.0	63	.....	.8	12	96	2.8
Jan. 30	Feb. 8	55	33	.60	.....	16	.40	23	3.6	.....	.0	76	.....	.4	4.5	99	3.0
Feb. 25	Mar. 7	45	32	.71	.....	14	.10	24	2.4	.....	.0	80	.....	.4	6.5	103	4.5
Mar. 8	Mar. 17	60	48	.80	.....	10	.40	26	3.2	.....	.0	85	.....	.3	11	114	5.7
Mar. 18	Mar. 27	275	237	.86	.....	37	.20	20	6.4	.....	.0	85	.....	.7	8.5	136	3.4
Mar. 28	Apr. 6	240	193	.80	.....	38	.20	19	.....	.....	.0	78	.....	.4	10	136	2.8
Apr. 7	Apr. 16	135	136	1.01	.....	30	.30	26	.....	.....	.0	98	.....	.2	6.5	133	4.4
Apr. 17	Apr. 26	155	164	1.06	.....	15	.20	22	.....	.....	.0	85	.....	1.1	9.0	105	3.9
Apr. 27	May 6	170	196	1.15	.....	20	.30	20	3.6	.....	.0	73	.....	.9	7.5	99	3.9
May 7	May 14	105	88	.84	.....	12	.20	20	4.4	.....	.0	73	.....	.8	6.5	88	5.1
May 15	May 24	55	58	1.06	.....	15	.20	22	5.5	12	.....	102	4.3	.5	10	109	2.4
May 25	June 3	85	60	.71	.....	12	.40	22	5.7	.....	.....	95	5.0	.5	11	110	2.3
June 4	June 13	325	450	1.38	.....	17	.6	21	4.3	12	.0	90	5.8	1.3	10	120	6.9
June 14	June 23	335	365	1.09	.....	20	.40	24	4.7	.....	.0	103	4.9	2.0	6.0	125	5.6
June 24	July 3	460	290	.63	.....	25	.30	21	5.0	7.9	.0	101	7.2	1.4	7.0	126	2.9
July 4	July 13	267	221	.83	.....	19	.40	20	4.8	.....	.0	99	5.6	.6	9.5	120	2.0
July 14	July 24	310	300	.97	.....	19	.40	23	5.0	8.2	.0	93	8.1	1.1	7.0	118	3.3
Aug. 4	Aug. 13	350	184	.53	9.1	30	1.4	24	5.6	7.2	Tr.[b]	98	6.9	1.2	11	141	1.8
Aug. 14	Aug. 23	425	177	.42	7.2	30	1.1	.....	5.3	9.1	Tr.[b]	101	6.6	1.2	9.6	139	1.7
Aug. 24	Sept. 2	400	202	.50	11	33	1.4	28	5.9	6.9	[b]3.6	89	7.1	1.0	11	143	1.7
Sept. 3	Sept. 13	285	117	.41	6.1	44	1.0	25	6.4	10	[b]3.6	92	7.1	Tr.	17	164	1.8
Sept. 14	Sept. 28	700	506	.72	18	49	1.9	22	5.7	6.6	Tr.[b]	88	8.4	1.5	13	164	3.1
Sept. 30	Oct. 15	110	81	.74	3.8	57	1.1	24	6.5	3.8	[b]4.8	85	6.2	.5	14	162	1.7
Oct. 16	Oct. 26	20	45	2.25	.9	15	.08	26	7.4	6.6	[b]4.8	96	6.5	.....	5.8	119	0.8
Mean		204	156	.81	.....	25	.54	22	4.3	8.2	.0	86	6.4	.8	9.6	122	....
Per ct. of anhydrous residue		....	.....	.....	.....	21.0	[c].6	18.4	3.6	6.9	35.5	....	5.4	.6	8.0	.....	....

[a] Analyses October 26, 1906, to May 14, 1907, by Jas. R. Evans; May 15 to July 24, 1907, by W. D. Collins; August 4 to October 26, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Tennessee River near Gilbertsville, Ky.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—																
Oct. 24	Nov. 10	40	35	0.87	.....	30	0.8	11	.....	.....	0.0	56	.....	0.4	2.0	99	6.0
Nov. 11	Nov. 21	290	258	.89	.....	28	.6	12	2.8	.....	.0	51	.....	.8	1.0	94	9.6
Nov. 22	Dec. 10	225	186	.83	.....	36	.40	14	3.2	.....	.0	49	.....	.8	1.5	102	15.4
Dec. 11	Dec. 20	205	161	.78	.....	31	.6	13	4.8	.....	.0	54	.....	1.0	1.5	109	8.1
Dec. 21	Dec. 30	125	94	.75	.....	15	.30	17	3.2	.....	.0	61	.....	.7	7.0	96	11.2
Dec. 31	Jan. 10	270	245	.91	.....	28	.40	14	4.8	.....	.0	61	.....	1.1	3.0	120	19.6
Jan. 11	Jan. 20	30	21	.70	.....	26	.40	16	6.0	.....	.0	71	.....	1.2	2.7	102	10.8
Jan. 21	Jan. 30	35	19	.54	.....	12	.20	19	4.0	.....	.0	76	.....	.5	2.5	88	12.9
Jan. 31	Feb. 9	190	158	.83	.....	27	.40	16	1.2	.....	.0	....	.....	1.0	2.0	84	18.0
Feb. 10	Feb. 19	95	74	.78	.....	17	.30	17	1.6	.....	.0	68	.....	.4	2.2	85	10.3
Feb. 20	Mar. 1	380	290	.76	.....	26	.40	15	4.4	.....	.0	54	.....	.3	2.0	79	7.3
Mar. 2	Mar. 11	170	142	.84	.....	22	.10	20	4.8	.....	.0	64	.....	.3	1.0	86	22.3
Mar. 12	Mar. 21	210	185	.88	.....	38	.20	24	.....	.....	.0	88	.....	.7	3.8	130	19.2
Mar. 22	Mar. 31	40	32	.80	.....	21	.20	17	5.2	.....	.0	68	.....	.3	2.0	95	12.8
Apr. 1	Apr. 10	210	196	.93	.....	32	.20	22	2.0	.....	.0	73	.....	.1	2.0	112	7.4
Apr. 11	Apr. 22	80	75	.94	.....	16	.40	16	6.0	.....	.0	68	.....	1.3	3.5	82	9.2
Apr. 23	May 2	115	124	1.08	.....	18	.30	17	6.4	.....	.0	73	.....	1.1	4.5	90	10.0
May 3	May 12	105	96	.91	.....	16	.20	18	.....	.....	.0	73	.....	1.0	4.0	90	17.6
May 14	May 24	175	172	.98	.....	.....	1.0	.....	2.8	5.7	.0	61	12	1.8	1.0	106	17.0
May 25	June 3	90	143	1.59	.....	11	.20	22	2.5	9.2	.0	73	13	2.2	1.4	112	7.0
June 4	June 13	50	57	1.14	.....	11	.17	21	4.8	5.4	.0	73	11	Tr.	2.3	91	8.4
June 14	June 25	125	109	.87	.....	6.6	.40	20	4.9	8.6	.0	72	12	4.0	4.8	114	10.8
June 26	July 7	250	201	.80	.....	8.8	.....	26	3.8	3.8	.0	93	11	3.1	2.2	103	6.3
July 8	July 17	140	135	.96	.....	14	.30	21	2.2	7.5	.0	82	12	2.1	1.9	102	4.6
July 18	July 28	160	100	.62	.....	11	.28	21	5.6	10	.0	82	13	1.8	2.9	118	5.3
July 29	Aug. 9	115	76	.66	.....	15	.21	24	5.2	.....	.0	87	13	1.8	4.0	....	3.7
Aug. 10	Aug. 20	75	91	1.21	.....	12	.05	21	4.5	.....	.0	....	14	1.9	2.5	95	3.4
Aug. 21	Aug. 31	85	80	.94	.....	11	.29	21	3.8	6.7	.0	76	14	2.7	4.3	107	3.4
Sept. 2	Sept. 11	80	82	1.02	.....	15	.28	24	5.8	10	.0	88	9.6	0.5	4.0	112	3.1
Sept. 12	Sept. 23	190	106	.56	1.6	20	.6	21	5.3	6.1	.0	87	7.9	2.0	4.2	108	3.3
Sept. 24	Oct. 3	290	170	.59	4.9	27	1.0	21	4.9	5.4	.0	90	7.1	1.2	4.8	121	6.5
Oct. 4	Oct. 14	375	184	.49	7.0	19	1.2	19	3.5	12	[c]4.8	71	7.4	1.1	6.0	107	4.1
Oct. 15	Oct. 24	40	94	2.35	.....	12	.08	20	3.6	9.4	[c]3.6	72	6.4	Tr.	3.0	89	2.5
Mean		153	127	.90	.....	20	.39	19	4.1	7.7	.0	72	11	1.2	3.0	101	.....
Per ct. of anhydrous residue		....	....	.....	.....	19.6	[d].6	18.6	4.0	7.5	34.8	....	10.8	1.2	2.9	....	.....

[a] Analyses October 24, 1906, to May 12, 1907, by J. R. Evans; May 14 to September 11, 1907, by Walton Van Winkle; September 12 to October 24, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Gaging station at Johnsonville, Tenn., 80 miles above.

[c] Abnormal; computed as HCO_3 in the average.

[d] Fe_2O_3.

Mineral analyses of water from Tombigbee River near Epes, Ala.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 24	Nov. 2	95	61	0.64	.....	37	0.40	12	2.8	......	0.0	49	.....	0.4	3.5	95	3.7
Nov. 3	Nov. 12	85	60	.70	.....	34	.20	11	2.8	......	.0	46	.....	.3	3.0	85	1.9
Nov. 13	Nov. 22	90	88	.98	.....	23	.9	17	2.4	......	.0	71	.....	.3	2.5	104	4.1
Nov. 23	Dec. 2	90	58	.64	.....	36	.30	.....	Tr.	......	.0	....	.....	.1	2.0	71	9.8
Dec. 3	Dec. 12	85	54	.63	.....	32	.40	.....	Tr.	......	.0	....	.....	.4	1.5	68	5.3
Dec. 13	Dec. 22	95	64	.67	.....	27	.20	.....	Tr.	......	.0	....	.....	.6	1.8	57	10.7
Dec. 23	Jan. 1	135	105	.78	.....	40	.40	22	2.4	......	.0	76	.....	.5	5.0	129	11.2
Jan. 2	Jan. 14	55	39	.71	.....	20	.40	16	.....	......	.0	73	.....	.4	4.0	100	12.5
Jan. 15	Jan. 24	30	19	.63	.....	19	.8	18	2.0	......	.0	61	.....	.3	4.5	93	7.0
Jan. 25	Feb. 3	145	100	.69	.....	33	.20	21	1.6	......	.0	61	.....	.3	3.5	102	10.5
Feb. 4	Feb. 13	130	99	.76	.....	22	.6	12	1.2	......	.0	41	.....	.8	2.2	75	31.1
Feb. 14	Feb. 24	8	5.6	.70	.....	9.6	.10	12	Tr.	......	.0	39	.....	.5	3.8	51	7.8
Feb. 25	Mar. 9	380	310	.82	.....	31	.40	22	2.4	......	.0	68	.....	.2	3.0	118	28.0
Mar. 11	Mar. 20	85	64	.75	.....	19	.40	14	3.2	......	.0	51	.....	.4	2.5	73	20.6
Mar. 21	Mar. 30	55	48	.87	.....	21	.40	18	5.2	......	.0	66	.....	.6	3.5	88	8.4
Mar. 31	Apr. 13	140	156	1.12	.....	26	.30	17	2.8	......	.0	56	.....	.3	3.5	92	5.8
Apr. 14	Apr. 23	320	300	.94	.....	28	.8	20	2.4	......	.0	68	.....	.4	3.5	97	9.4
Apr. 24	May 3	450	415	.92	.....	33	.9	22	2.4	......	.0	73	.....	.2	4.0	104	12.3
May 4	May 13	120	95	.79	.....	21	1.0	20	1.6	......	.0	61	.....	.1	3.5	88	31.2
May 14	May 24	180	118	.66	7.0	15	1.0	20	1.9	8.5	.0	79	6.2	.0	1.8	94	33.8
May 25	June 3	300	179	.60	10	......	1.6	21	2.6	12	.0	93	5.9	Tr.	1.8	....	21.6
June 4	June 20	220	129	.59	7.9	23	1.0	22	1.9	8.2	.0	72	6.4	Tr.	1.8	104	12.1
June 22	July 2	260	252	.97	8.8	30	.52	.....	.....	11	.0	90	6.6	Tr.	2.4	127	4.3
July 3	July 12	200	147	.73	8.8	39	1.0	.....	2.0	11	.0	94	7.1	Tr.	2.6	129	3.5
July 13	July 22	45	46	1.02	2.4	27	1.0	23	1.8	12	.0	83	6.7	Tr.	3.2	119	2.9
July 23	Aug. 1	35	28	.80	2.4	25	1.2	19	1.6	10	.0	....	5.9	Tr.	1.8	96	2.4
Aug. 2	Aug. 11	60	30	.50	3.7	20	1.0	18	1.5	11	.0	....	7.9	.2	4.2	95	1.7
Aug. 12	Aug. 21	100	78	.78	3.3	23	.32	21	.9	11	.0	75	5.7	1.7	2.6	102	1.6
Aug. 22	Aug. 31	90	47	.52	3.5	29	1.0	22	.8	11	.0	82	6.1	1.5	2.4	115	2.0
Sept. 14	Sept. 24	20	20	1.00	1.5	16	.52	21	.9	8.8	.0	73	4.8	1.4	3.4	94	.7
Sept. 25	Oct. 4	50	60	1.20	1.5	23	.33	18	1.5	12	.0	71	5.2	1.3	3.0	98	1.4
Oct. 5	Oct. 14	20	25	1.25	1.3	10	.24	16	1.0	7.9	.0	50	6.7	5.0	2.6	71	.9
Oct. 15	Oct. 24	10	16	1.60	1.1	18	.98	13	1.2	7.6	.0	46	6.5	1.2	3.0	73	1.0
Mean		126	100	.82	.....	25	.63	18	1.8	10	.0	67	6.3	.6	3.0	94	....
Per ct. of anhydrous residue		.....	.....	.....	.....	25.4	[b].9	18.3	1.8	10.1	33.5	....	6.4	.6	3.0	....	....

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[a] Analyses October 24, 1906, to May 13, 1907, by J. R. Evans; May 14 to October 14, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Fe_2O_3.

Mineral analyses of water from Wabash River near Logansport, Ind.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—														
Sept. 9	Sept. 18	105	80	0.76	......	0.15	66	62	382	[b]7.9	190	82	0.0	741	1,461
Sept. 19	Sept. 29	50	31	.62	11	Tr.	102	60	......	.0	259	97	.0	690	1,515
Sept. 30	Oct. 9	20	18	.90	17	.10	109	63	......	.0	242	100	.0	737	1,596
Oct. 12	Oct. 21	10	3.6	.36	8.0	.10	117	68	434	.0	258	114	Tr.	866	1,785
Oct. 22	Oct. 31	10	6.0	.60	9.6	.20	128	77	473	.0	276	101	.0	915	1,882
Nov. 1	Nov. 10	10	7.2	.72	10	.10	112	......	478	.0	314	112	.4	960	1,940
Nov. 11	Nov. 20	10	7.4	.74	13	.08	133	74	461	.0	317	138	.0	889	1,905
Nov. 21	Nov. 30	125	128	1.02	11	.20	91	33	169	.0	206	93	18	320	841
Dec. 1	Dec. 10	150	128	.85	19	.40	77	36	112	.0	218	97	11	223	681
Dec. 11	Dec. 21	145	140	.97	22	.85	68	25	61	.0	166	75	11	114	498
Dec. 22	Dec. 31	50	39	.78	17	.20	92	36	105	.0	259	102	18	198	703
Jan. 1	Jan. 10	295	270	.92	29	......	48	15	34	.0	127	61	9.7	57	323
Jan. 12	Jan. 20	240	205	.85	21	1.2	52	17	28	.0	144	44	13	51	309
Jan. 21	Jan. 30	280	161	.57	27	1.2	52	17	33	.0	150	52	5.6	49	320
Jan. 31	Feb. 9	10	4.4	.44	8.4	.10	97	35	97	.0	298	99	6.4	175	651
Feb. 10	Feb. 20	Tr.	Tr.	......	16	Tr.	102	36	119	.0	292	94	6.0	222	727
Feb. 21	Mar. 3	10	4.0	.40	10	Tr.	94	35	115	.0	278	111	8.4	204	711
Mar. 4	Mar. 13	370	285	.77	6.4	.05	83	34	118	.0	......	88	7.3	218	713
Mar. 14	Mar. 23	650	435	.67	38	1.2	43	15	22	.0	116	46	16	35	311
Mar. 24	Apr. 3	145	86	.59	12	.25	57	19	38	.0	187	60	4.4	60	374
Apr. 4	Apr. 14	30	18	.60	10	.20	60	25	83	.0	240	76	6.7	153	559
Apr. 15	Apr. 25	5	Tr.	......	8.0	.22	......	33	98	.0	258	87	7.9	222	697
Apr. 26	May 7	10	......	......	10	.07	89	36	115	.0	234	89	3.2	223	748
May 8	May 17	8	......	......	5.0	.04	87	32	98	.0	242	89	4.3	185	672
May 18	May 28	20	28	1.40	......	.04	90	33	......	.0	260	85	4.1	233	713
May 29	June 7	90	99	1.10	9.8	.20	66	22	59	.0	195	60	6.1	117	478
June 8	June 18	150	155	1.03	18	.15	67	18	31	.0	194	42	7.5	63	388
June 19	June 28	230	208	.90	11	.15	61	20	53	.0	207	53	5.0	89	422
June 29	July 8	50	52	1.04	11	.05	88	29	......	.0	277	63	4.4	188	620
July 10	July 21	900	802	.89	14	.10	63	20	62	.0	195	50	8.8	95	425
July 22	July 31	140	115	.82	11	.02	67	22	53	.0	239	56	2.9	83	434
Aug. 1	Aug. 10	50	116	2.32	11	.05	84	33	102	.0	288	64	2.2	174	659
Aug. 11	Aug. 20	85	74	.87	9.0	.05	85	35	108	.0	292	73	1.8	214	734
Aug. 21	Aug. 30	75	66	.88	20	.05	89	44	176	.0	295	80	1.8	313	932
Aug. 31	Sept. 9	75	84	1.12	9.8	.08	67	24	94	.0	217	48	3.5	150	527
Mean............		132	117	.85	14	.23	82	35	142	.0	234	79	5.9	292	807
Per ct. of anhydrous residue..		....	......	......	1.8	[c].0	10.7	4.6	18.5	15.1	......	10.3	.8	38.2	......

[a] Analyses September 9, 1906, to February 9, 1907, by W. M. Barr; February 10 to March 3, 1907, by H. S. Spaulding; March 4 to September 9, 1907, by Walton Van Winkle.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Wabash River at Vincennes, Ind.[a]

[Parts per million, unless otherwise stated.]

Date (1906–7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
From—	To—															
Sept. 9	Sept. 19	50	38	0.76	8.0	0.05	54	26	46	0.0	232	55	1.3	84	421	1.6
Sept. 20	Oct. 1	90	36	.40	5.4	.05	65	24	49	.0	254	56	1.3	90	436	1.3
Oct. 2	Oct. 16	....	21	......	12	.10	61	25	31	.0	232	64	4.4	60	376	2.3
Oct. 17	Oct. 30	15	18	1.20	12	Tr.	75	26	54	.0	266	68	4.4	89	470	1.4
Oct. 31	Nov. 13	25	26	1.04	10	Tr.	73	30	60	.0	279	60	1.8	104	504	1.1
Nov. 14	Nov. 24	205	187	.91	11	Tr.	68	27	......	.0	246	65	2.2	84	436	3.9
Nov. 25	Dec. 4	180	181	1.00	12	.25	63	20	36	.0	200	71	11	53	360	9.1
Dec. 5	Dec. 15	290	294	1.02	5.2	.40	64	18	19	.0	188	67	16	29	322	8.9
Dec. 15	Dec. 25	135	164	1.22	12	.40	59	16	21	.0	196	58	18	26	330	13.2
Dec. 26	Jan. 5	190	214	1.13	13	.6	62	22	19	.0	209	61	5.3	21	307	10.5
Jan. 7	Jan. 17	170	122	.72	15	.7	45	16	12	.0	.....	39	13	13	232	22.8
Jan. 18	Jan. 27	315	194	.62	30	.....	.....	.....	8.1	.0	147	39	6.5	8.3	209	23.3
Jan. 28	Feb. 6	120	68	.57	18	.9	47	19	12	.0	168	.....	6.1	8.8	242	19.4
Feb. 7	Feb. 18	40	52	1.30	12	.10	69	23	......	.0	264	73	8.1	24	348	7.0
Feb. 19	Feb. 28	30	28	.93	12	.05	69	22	25	.0	255	60	8.8	30	358	6.0
Mar. 1	Mar. 10	50	36	.72	15	.15	69	25	29	.0	256	72	8.5	28	356	6.4
Mar. 11	Mar. 25	625	624	1.00	36	1.8	46	22	10	.0	171	46	6.1	21	287	18.6
Mar. 26	Apr. 15	75	70	.93	16	.18	58	17	12	.0	216	.....	7.8	16	288	8.0
Apr. 16	Apr. 24	75	43	.57	9.0	.09	.....	23	20	.0	246	61	7.9	27	339	5.3
Apr. 27	May 8	50	76	1.52	10	.28	62	24	26	.0	228	61	6.9	37	350	7.9
May 10	May 19	85	187	2.20	6.4	.17	61	24	20	.0	264	57	.8	27	335	5.9
May 20	June 1	425	656	1.54	3.0	.21	51	17	19	.0	192	46	6.6	14	268	6.8
June 3	June 13	195	305	1.56	5.6	.01	51	15	13	.0	.....	.....	16	15	295	15.8
June 14	June 26	170	221	1.30	14	.05	62	.....	21	.0	220	51	11	33	329	7.2
June 27	July 7	300	381	1.27	16	.20	62	22	17	.0	255	44	7.5	20	317	6.0
July 8	July 18	280	270	.97	12	.20	62	20	21	.0	252	45	.9	24	316	5.5
July 19	July 31	300	409	1.36	16	.02	53	17	15	.0	208	37	3.5	14	283	8.2
Aug. 1	Aug. 14	450	567	1.26	14	.01	62	20	21	.0	253	50	2.0	13	311	4.3
Aug. 15	Aug. 26	130	156	1.20	13	.09	62	21	24	.0	262	45	1.9	20	302	3.8
Aug. 27	Sept. 6	80	246	3.07	9.2	.04	64	24	29	.0	264	45	1.1	26	322	3.8
Sept. 7	Sept. 16	30	81	2.70	28	.01	61	20	28	.0	241	49	1.1	43	362	3.7
Mean		172	193	1.20	13	.24	61	22	25	.0	230	55	6.4	36	336	.....
Per ct. of anhydrous residue		....	....	......	3.9	[c].1	18.4	6.6	7.5	34.1	.....	16.6	2.0	10.8	.....	.....

[a] Analyses September 9, 1906, to February 6, 1907, by W. M. Barr; February 7 to 28, 1907, by H. S. Spaulding; March 1 to September 16, 1907, by Walton Van Winkle.

[b] Gaging station at Mount Carmel, Ill., 30 miles below.

[c] Fe_2O_3.

Mineral analyses of water from Wateree River near Camden, S. C.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_3).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).
From—	To—																
Oct. 21	Oct. 30	70	65	0.93	.....	25	......	6.8	4.8	.....	0.0	33	.....	0.9	2.5	65	14.8
Nov. 1	Nov. 10	55	13	.24	.....	24	0.5	5.5	.8	.....	.0	22	.....	Tr.	4.0	58	8.3
Nov. 11	Nov. 20	45	21	.47	.....	28	.9	4.7	Tr.	.....	.0	....	.....	.3	2.0	60	7.7
Nov. 21	Dec. 1	75	28	.37	.....	31	.7	6.0	1.2	.....	.0	22	.....	.4	3.0	70	10.8
Dec. 2	Dec. 13	60	25	.42	.....	28	.8	5.5	1.6	.....	.0	22	.....	.5	2.8	65	8.1
Dec. 14	Dec. 24	85	50	.59	.....	31	.9	6.2	1.6	.....	.0	24	.....	.6	2.5	69	8.8
Dec. 25	Jan. 3	125	62	.50	.....	43	.20	......	.8	.....	.0	37	.....	.5	4.0	95	10.4
Jan. 4	Jan. 14	75	62	.83	.....	20	.40	4.2	Tr.	.....	.0	....	.....	.8	4.0	56	8.9
Jan. 16	Jan. 25	10	7.0	.70	.....	16	.10	......	1.2	.....	.0	39	.....	.1	3.0	62	6.8
Jan. 26	Feb. 4	35	24	.68	.....	30	.30	8.0	2.0	.....	.0	32	.....	.9	3.5	73	6.3
Feb. 5	Feb. 15	35	29	.83	.....	15	.30	8.8	2.0	.....	.0	30	.....	.1	3.3	51	9.3
Feb. 16	Feb. 26	60	48	.80	.....	17	.10	9.6	1.6	.....	.0	32	.....	.4	4.0	60	7.7
Feb. 27	Mar. 8	80	65	.81	.....	18	.20	8.4	Tr.	.....	.0	27	.....	.3	4.0	60	10.3
Mar. 10	Mar. 19	65	51	.78	.....	16	.10	......	1.2	.....	.0	46	.....	.8	1.2	69	8.3
Mar. 20	Mar. 29	105	94	.90	.....	16	.20	9.2	.8	.....	.0	29	.....	.6	2.0	48	6.6
Mar. 30	Apr. 8	35	34	.97	.....	19	.20	10	1.2	.....	.0	34	.....	.5	3.5	68	6.1
Apr. 9	Apr. 18	15	14	.93	.....	23	.20	7.2	2.8	.....	.0	29	.....	.2	3.0	58	6.3
Apr. 19	Apr. 28	80	99	1.24	.....	29	.30	5.0	1.6	.....	.0	22	.....	.1	4.5	61	10.6
Apr. 29	May 9	75	84	1.12	.....	21	.20	5.5	.8	5.0	.0	22	Tr.	.2	4 0	48	8.5
May 10	May 19	140	94	.67	.....	26	[b]2.8	6.1	4.0	6.0	.0	47	2.0	.4	3.0	91	6.8
May 20	May 30	325	254	.78	.....	41	[b]3.2	7.3	2.8	.....	.0	43	4.3	.3	2 0	118	6 2
May 31	June 9	500	546	1.09	.....	19	[b]3.2	4.5	1.3	10	.0	35	5.6	.5	3 0	115	14.5
June 10	June 19	600	720	1.20	.....	25	[b]3.0	4.9	2.4	6.1	.0	37	6.6	.3	2.0	90	10.4
June 20	June 29	500	544	1.09	.....	31	[b]4.0	4.9	3.1	3.5	.0	35	1.8	.5	2.0	108	8.4
June 30	July 9	730	619	.85	.....	34	[b]4.0	6.3	2.3	6.3	.0	37	5.9	.2	3 0	106	9.3
July 10	July 19	566	494	.87	.....	31	[b]2.0	6.5	2.6	7.5	.0	41	5.4	.2	2.5	112	8.3
July 20	July 29	960	606	.63	9.6	19	.03	5.3	1.8	11	.0	40	4.3	.7	1.9	60	7.2
July 30	Aug. 9	960	606	.63	11	22	.40	5.8	1.4	11	.0	40	4.6	.7	1.7	68	6.6
Aug. 10	Aug. 20	475	421	.89	21	20	.07	5.6	1.4	8.7	.0	39	4.4	.5	1.4	63	7.3
Aug. 24	Sept. 3	525	406	.77	18	23	.06	5.0	1.4	11	.0	38	4.1	.6	2.2	64	6.9
Sept. 4	Sept. 14	400	231	.58	15	17	.04	5.5	2.3	8.8	.0	39	4.4	.3	2.2	60	5.3
Sept. 15	Sept. 24	350	284	.81	10	....	.04	8.0	4.4	12	.....	....	5.4	Tr.	1.4	....	4.8
Sept. 25	Oct. 4	550	530	.96	24	31	Tr.	3.1	1.4	7.6	.0	26	4.6	.5	2.2	74	10.7
Oct. 15	Oct. 25	45	40	.89	2.2	33	.03	6.1	1.4	12	.0	43	4.3	Tr.	2.2	77	4.0
Mean		259	214	.79	.....	25	.28	6.3	1.8	8.4	.0	34	4.2	.4	2.8	73	.....
Per ct. of anhydrous residue		....	.....	......	.....	37.9	[c].6	9.5	2.7	12.7	25.4	....	6.4	.6	4.2	....	.....

[a] Analyses October 21, 1906, to May 9, 1907, by Jas. R. Evans; May 10 to July 19, 1907, by W. D. Collins; July 20 to October 25, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Omitted from average.

[c] Fe_2O_3.

Mineral analyses of water from East Fork of White River near Azalia, Ind.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
Sept. 12	Sept. 23	25	22	0.88	29	Tr.	......	......	8.6	0.0	293	24	1.8	8.0	305
Sept. 24	Oct. 3	55	61	1.11	13	0.10	56	24	7.6	.0	268	30	2.2	5.5	264
Oct. 5	Oct. 15	25	29	1.16	18	.10	64	25	15	.0	290	26	3.9	3.7	290
Oct. 16	Oct. 25	10	14	1.40	9.6	Tr.	66	26	12	.0	300	25	.9	4.1	280
Oct. 26	Nov. 4	10	9.2	.92	13	Tr.	63	29	16	.0	319	35	.5	5.9	302
Nov. 5	Nov. 16	5	Tr.	......	15	.05	70	28	13	.0	316	33	1.4	2.0	305
Nov. 17	Nov. 27	95	98	1.03	11	.30	53	18	12	.0	225	34	4.4	2.4	236
Nov. 28	Dec. 7	25	26	1.04	18	.05	67	24	......	.0	307	40	9.7	2.7	311
Dec. 8	Dec. 18	40	39	.98	22	.10	62	20	13	.0	266	37	8.8	2.3	289
Dec. 19	Dec. 28	10	3.2	.32	13	.05	66	27	5.6	.0	303	33	9.7	......	306
Dec. 29	Jan. 7	125	114	.91	21	1.2	42	......	7.5	.0	176	28	4.4	1.3	196
Jan. 8	Jan. 17	70	32	.46	16	Tr.	45	15	4.8	.0	184	35	7.9	1.6	197
Jan. 18	Jan. 27	120	67	.56	16	.40	43	16	6.3	.0	177	23	7.0	2.0	196
Jan. 28	Feb. 7	5	Tr.	......	22	Tr.	70	27	......	.0	300	32	7.3	2.2	307
Feb. 8	Feb. 17	5	7.6	1.52	12	.10	79	26	......	.0	320	39	9.2	2.7	312
Feb. 18	Feb. 27	5	2.0	.40	15	Tr.	68	28	11	.0	318	34	6.2	2.5	331
Feb. 28	Mar. 10	50	53	1.06	15	Tr.	60	22	9.4	.0	267	34	9.9	2.3	272
Mar. 11	Mar. 20	220	155	.70	21	.8	42	......	11	.0	192	18	8.6	2.5	209
Mar. 21	Mar. 30	30	32	1.07	11	.15	64	21	7.9	.0	284	31	5.0	2.8	280
Mar. 31	Apr. 9	10	Tr.	......	10	.10	60	22	5.6	.0	......	30	8.8	2.0	269
Apr. 10	Apr. 19	3	Tr.	......	11	.05	58	24	7.6	.0	279	33	12	2.3	283
Apr. 21	Apr. 29	20	31	1.55	6.6	.20	56	23	7.8	.0	246	36	9.6	2.4	261
Apr. 30	May 9	10	Tr.	......	8.0	.01	59	24	6.7	.0	268	31	7.5	2.3	280
May 10	May 21	75	62	.83	6.8	.04	......	24	6.2	.0	266	32	4.4	2.5	256
May 22	May 31	105	94	.90	9.0	.16	58	23	5.9	.0	258	33	6.0	2.2	269
June 1	June 11	245	240	.98	14	.25	54	17	5.9	.0	230	23	10	1.6	240
June 12	June 23	60	93	1.55	25	.20	64	19	5.2	.0	269	28	4.4	1.9	292
June 24	July 3	10	Tr.	......	15	.01	66	24	7.3	.0	323	26	4.2	3.1	305
July 4	July 14	245	213	.87	13	.35	58	21	9.2	.0	263	26	6.0	1.6	256
July 15	July 24	75	78	1.04	15	.12	64	23	13	.0	300	27	7.8	2.0	303
July 25	Aug. 3	50	......	......	13	.08	67	......	12	.0	304	28	4.9	2.5	297
Aug. 4	Aug. 13	10	47	4.70	13	.01	72	26	14	.0	316	35	1.6	3.8	334
Aug. 14	Aug. 24	10	14	1.40	18	Tr.	......	25	......	.0	316	31	1.1	......	329
Aug. 25	Sept. 3	10	28	2.80	12	.10	65	25	9.2	.0	308	29	2.2	4.0	291
Sept. 4	Sept. 13	5	Tr.	......	14	.01	64	25	13	.0	320	29	2.6	5.3	300
Sept. 14	Sept. 23	30	30	1.00	16	Tr.	67	22	11	[b] 8.4	261	26	2.2	6.0	286
Sept. 24	Oct. 3	25	26	1.04	21	Tr.	66	22	12	[b] 12	259	28	1.7	6.2	292
Mean		52	48	1.18	15	.14	61	23	9.5	.0	276	30	5.6	3.1	279
Per ct. of anhydrous residue		......	......	......	5.3	[c] .1	21.5	8.1	3.3	48.0	......	10.6	2.0	1.1	....

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[a] Analyses September 12, 1906, to February 17, 1907, by W. M. Barr; February 18 to 27, 1907, by H. S. Spaulding; February 28 to September 13, 1907, by Walton Van Winkle; September 14 to October 3, 1907, by R. B. Dole, Chase Palmer, and W. D. Collins.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from West Fork of White River near Indianapolis, Ind.[a]

[Parts per million, unless otherwise stated.]

Date (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.
From—	To—														
Sept. 8	Sept. 18	25	18	0.72	27	0.10	81	36	78	0.0	301	67	1.7	145	590
Sept. 19	Sept. 28	20	12	.60	20	Tr.	83	43	127	.0	303	78	.5	262	793
Sept. 29	Oct. 8	25	13	.52	22	.7	78	37	91	[b] 6.5	280	74	.9	195	668
Oct. 9	Oct. 19	15	5.6	.37	11	.10	84	37	109	.0	293	73	1.1	215	701
Oct. 20	Oct. 31	10	5.2	.52	8.4	.10	93	......	138	.0	331	125	.7	207	705
Nov. 1	Nov. 11	10	11	1.10	19	Tr.	95	38	129	.0	344	75	1.3	251	798
Nov. 12	Nov. 21	10	8.8	.88	14	.20	95	36	123	.0	353	79	2.2	216	754
Nov. 23	Dec. 2	40	28	.70	18	Tr.	73	27	44	.0	266	78	13	63	448
Dec. 3	Dec. 12	30	21	.70	22	.13	77	34	47	.0	287	85	9.7	72	474
Dec. 13	Dec. 22	30	29	.97	20	.20	71	33	26	.0	254	76	13	38	382
Dec. 23	Jan. 4	40	27	.68	16	.8	79	28	34	.0	290	68	8.8	55	412
Jan. 5	Jan. 14	125	96	.77	13	.5	50	......	14	.0	205	41	14	14	249
Jan. 15	Jan. 25	125	101	.81	18	.6	48	17	20	.0	......	36	9.5	13	245
Jan. 26	Feb. 4	20	25	1.25	12	.10	79	26	20	.0	293	56	6.3	35	378
Feb. 5	Feb. 14	10	4.8	.48	10	.10	86	32	38	.0	349	61	7.6	52	451
Feb. 16	Feb. 25	Tr.	Tr.	......	10	.10	82	29	38	.0	311	60	9.7	60	441
Feb. 26	Mar. 7	5	......	......	15	.08	79	31	49	.0	314	52	5.9	65	454
Mar. 8	Mar. 17	235	124	.53	9.0	.20	62	23	26	.0	......	38	9.7	30	305
Mar. 18	Mar. 27	35	30	.86	16	Tr.	64	24	21	.0	262	42	4.7	26	339
Mar. 28	Apr. 7	10	......	......	7.0	.10	66	24	32	.0	266	47	10	46	351
Apr. 8	Apr. 17	5	Tr.	......	12	.18	75	27	36	.0	281	55	5.8	62	422
Apr. 18	Apr. 27	5	Tr.	......	8.8	.20	65	30	41	.0	273	60	4.8	67	414
Apr. 29	May 8	10	34	3.40	8.8	.05	69	30	34	.0	280	59	6.2	57	425
May 9	May 19	10	......	......	10	.02	72	29	35	.0	282	48	4.1	57	416
May 20	May 30	20	50	2.50	6.8	.02	74	27	35	.0	282	58	8.3	70	415
June 1	June 10	80	52	.65	9.6	.01	61	22	18	.0	236	44	5.6	33	343
June 11	June 20	50	71	1.42	23	.05	67	21	14	.0	260	42	3.4	21	332
June 21	June 30	25	......	......	16	.06	69	26	......	.0	298	45	7.9	34	365
July 1	July 11	50	36	.72	13	.10	70	27	29	.0	298	49	7.1	43	380
July 13	July 22	130	122	.94	14	.05	66	19	17	.0	259	20	6.0	15	300
July 23	Aug 2	80	111	1.39	9.0	.01	72	22	26	.0	305	40	6.6	27	357
Aug. 3	Aug. 13	30	72	2.40	15	Tr.	74	28	31	.0	312	45	7.3	38	415
Aug. 14	Aug. 23	20	26	1.30	11	.02	77	30	42	.0	326	51	4.9	50	430
Aug. 24	Sept. 3	20	17	.85	12	.30	70	29	42	.0	295	58	1.3	54	408
Sept. 4	Sept. 12	10	......	......	15	.08	75	22	37	.0	298	47	4.8	42	396
Mean		39	38	1.04	14	.15	74	29	48	.0	291	58	6.1	78	450
Per ct. of anhydrous residue		......	......	......	3.1	[c] .0	16.4	6.4	10.7	31.8	......	12.9	1.4	17.3	....

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[a] Analyses September 8, 1906, to February 14, 1907, by W. M. Barr; February 16 to 25, 1907, by H. S. Spaulding; February 26 to September 12, 1907, by Walton Van Winkle.

[b] Abnormal; computed as HCO_3 in the average.

[c] Fe_2O_3.

Mineral analyses of water from Wisconsin River near Portage, Wis.[a]

[Parts per million unless otherwise stated.]

Date (1906-7). From—	Date (1906-7). To—	Turbidity.	Suspended matter.	Coefficient of fineness.	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Mean gage height (feet).[b]
Sept. 11	Sept. 20	10	7.6	0.76	26	0.25	14	7.3	9.2	0.0	66	.....	1.3	0.8	117	5.2
Sept. 21	Sept. 30	15	9.6	.64	16	.40	14	7.2	......	.0	68	13	.9	2.5	109	5.3
Oct. 1	Oct. 11	10	4.0	.40	13	Tr.	16	8.5	7.8	.0	66	13	.5	1.5	105	4.8
Oct. 12	Oct. 22	5	5.6	1.12	15	.30	16	8.3	10	.0	75	16	.5	1.0	98	4.9
Oct. 23	Oct. 31	5	9.2	1.84	19	Tr.	16	8.9	7.6	.0	60	24	Tr.	4.0	108	6.5
Nov. 1	Nov. 10	5	5.6	1.12	17	Tr.	15	7.3	7.1	.0	51	15	Tr.	2.5	100	6.1
Nov. 11	Nov. 21	10	6.0	.60	6.6	.10	14	6.2	7.8	.0	49	11	.4	1.5	100	5.7
Nov. 22	Dec. 1	10	4.0	.40	6.4	.10	13	5.4	7.6	.0	48	14	.4	6.0	93	6.8
Dec. 2	Dec. 11	10	10	1.00	16	.30	......	4.9	9.7	.0	43	19	1.3	1.3	89	6.8
Dec. 12	Dec. 22	10	5.6	.56	22	.40	13	7.4	11	.0	59	19	.4	3.2	112	6.5
Dec. 23	Jan. 1	5	2.0	.40	15	.40	14	6.8	......	.0	48	25	Tr.	.9	105	....
Jan. 2	Jan. 11	5	Tr.	......	16	.40	15	7.6	7.8	.0	72	19	.4	1.8	106	....
Jan. 12	Jan. 22	5	1.6	.32	15	.20	......	7.2	7.3	.0	72	23	1.4	2.8	102	....
Jan. 23	Feb. 1	5	Tr.	......	13	.25	16	9.6	5.9	.0	71	.....	Tr.	1.8	105	....
Feb. 2	Feb. 12	5	9.2	1.84	13	.40	18	6.7	13	.0	76	25	2.4	.....	108	....
Feb. 13	Feb. 23	5	2.0	.40	13	.20	......	7.6	10	.0	72	15	2.2	4.5	98	....
Feb. 24	Mar. 6	5	Tr.	......	11	.18	17	8.3	12	.0	75	23	1.6	2.1	109	....
Mar. 7	Mar. 17	10	10	1.00	10	.23	15	......	11	.0	73	.....	1.9	1.8	107	6.4
Mar. 18	Mar. 28	10	14	1.40	9.0	.20	11	7.2	5.1	.0	47	13	1.9	1.8	78	7.7
Mar. 29	Apr. 7	5	Tr.	......	5.8	.20	9.2	2.8	4.3	.0	26	11	1.7	1.2	65	12.3
Apr. 8	Apr. 17	10	.....	......	18	.15	11	4.8	......	.0	49	21	1.0	.6	96	9.2
Apr. 18	Apr. 27	5	Tr.	......	11	.20	10	4.9	5.9	.0	37	16	.5	1.9	78	7.8
Apr. 28	May 7	5	Tr.	......	7.6	.25	11	5.0	5.7	.0	35	17	Tr.	.....	87	7.9
May 8	May 17	Tr.	Tr.	......	6.8	.20	......	5.5	4.6	.0	43	11	Tr.	1.5	88	7.2
Mean		7	4.6	.86	13	.22	14	6.8	8.1	.0	58	17	.9	2.1	98	....
Per ct. of anhydrous residue		....	.....	......	14.3	[c].3	15.4	7.5	8.9	31.5	.....	18.8	1.0	2.3	......	....

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[a] Analyses September 11, 1906, to February 12, 1907, by W. M. Barr; February 13 to March 6, 1907, by H. S. Spaulding; March 7 to May 17, 1907, by Walton Van Winkle.

[b] Gaging station at Necedah, Wis., 50 miles below.

[c] Fe_2O_3.

Mineral analyses of water from Youghiogheny River near McKeesport, Pa.[a]

[Parts per million unless otherwise stated.]

Date. (1906-7).		Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Aluminum (Al).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K)	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Acidity as H_2SO_4.	Mean gage height (feet).[b]
From—	To—																		
Sept. 6	Sept. 16	4	....	....	....	11	6.7	....	37	14	13	0.0	0.0	....	Tr.	5.5	397	72	0.06
Sept. 17	Sept. 26	22	18	0.82	7.6	12	5.8	....	52	17	21	.0	.0	300	Tr.	6.0	453	75	....
Sept. 27	Oct. 6	5	11	2.20	8.4	10	7.0	....	42	16	16	.0	.0	245	0.0	5.0	374	66	.06
Oct. 7	Oct. 16	3	4	1.33	4.5	8.2	.5	5.0	29	8.4	12	.0	.0	172	.7	4.8	298	34	.65
Oct. 17	Oct. 26	8	10	1.25	3.3	8.4	.4	6.0	29	5.6	10	.0	.0	167	.8	5.8	249	20	.52
Oct. 27	Nov. 5	11	14	1.28	6.5	9.0	.5	7.2	29	5.6	12	.0	.0	174	.4	5.4	251	30	.21
Nov. 6	Nov. 15	8	19	2.38	9.9	7.8	.8	....	34	5.8	14	.0	.0	227	.6	5.7	311	53	.05
Nov. 16	Nov. 25	140	172	1.23	20	5.6	.2	4.0	22	3.2	8.8	.0	.0	127	.8	4.6	184	22	2.04
Nov. 26	Dec. 5	49	32	.65	5.7	5.6	.07	....	15	4.0	10	.0	.0	97	.8	3.4	118	16	1.25
Dec. 6	Dec. 16	190	443	2.33	19	5.2	.09	0.8	12	4.2	3.9	.0	[c]3.9	40	2.8	3.8	84	.0	4.50
Dec. 17	Dec. 27	50	39	.78	3.5	3.8	.12	2.6	14	4.8	4.4	.0	.0	73	2.8	3.8	119	10	3.41
Dec. 28	Jan. 7	190	238	1.25	17	7.8	.07	3.4	17	5.4	4.1	.0	.0	85	2.1	3.7	138	10	5.31
Jan. 8	Jan. 17	230	274	1.19	12	6.0	.06	2.0	14	4.2	....	.0	[c]5.1	62	2.1	3.1	103	.0	8.20
Jan. 18	Jan. 26	210	500	2.38	20	8.6	.06	5.6	20	5.6	5.7	.0	.0	104	1.9	3.6	164	10	7.60
Jan. 29	Feb. 7	47	39	.84	7.2	8.6	.35	8.2	23	7.5	6.9	.0	.0	141	2.0	4.8	226	33	3.70
Feb. 8	Feb. 17	43	54	1.26	8.6	8.2	.2	8.8	23	7.2	6.6	.0	.0	142	1.9	4.0	224	30	2.62
Feb. 18	Feb. 27	55	35	.64	8.8	7.2	.13	5.8	18	5.8	5.0	.0	.0	107	2.0	3.8	171	20	4.26
Feb. 28	Mar. 9	80	47	.59	13	6.4	.15	3.7	....	3.8	2.7	.0	.0	82	.5	3.8	127	15	3.21
Mar. 10	Mar. 22	1,600	1,580	.99	135	8.8	.10	2.3	....	5.2	5.5	.0	[c]7.5	86	1.6	2.6	140	.0	10.34
Mar. 23	Apr. 1	140	55	.39	18	11	.18	10	28	7.6	7.7	.0	.0	165	1.6	3.0	239	22	3.43
Apr. 2	Apr. 14	110	62	.56	26	11	.15	11	30	8.6	11	.0	.0	184	.6	5.0	277	66	2.00
Apr. 15	Apr. 24	240	178	.74	47	16	.07	2.8	17	5.2	7.6	.0	.0	86	1.3	4.2	140	17	3.26
Apr. 25	May 4	82	49	.60	12	7.6	.05	2.2	16	4.6	7.9	.0	.0	74	1.1	2.4	123	11	3.16
May 5	May 15	540	640	1.18	70	14	.06	0.5	20	6.4	8.2	.0	[c]7.3	78	1.1	5.0	143	.0	3.85
May 16	May 25	45	33	.73	12	8.4	.06	4.2	19	6.2	9.1	.0	.0	104	.7	4.2	157	11	2.37
May 26	June 4	160	103	.64	18	7.2	.05	2.2	16	5.2	7.2	.0	.0	74	.7	3.0	118	6.9	3.26
June 5	June 14	290	450	1.55	32	8.2	.03	0.7	13	3.6	9.1	.0	[c]6.1	54	1.1	2.4	98	.0	4.37
June 15	June 24	60	68	1.14	8.8	8.4	.04	2.2	17	5.2	8.8	.0	.0	80	1.1	4.2	129	3.4	3.09
June 25	July 4	7	21	3.00	6.0	7.8	.04	2.4	24	6.8	11	.0	.0	116	.7	6.6	181	22	1.36
July 5	July 14	52	67	1.29	16	9.4	.09	2.8	30	8.2	13	.0	.0	152	.6	5.8	236	28	1.51
July 16	July 26	46	51	1.11	3.2	6.8	.05	....	14	3.8	14	.0	[c]Tr.	66	1.3	4.8	112	.0	2.67
July 27	Aug. 5	106	118	1.12	9.8	6.8	.04	1.3	16	4.2	7.9	.0	.0	76	1.2	3.2	120	3.9	2.16
Aug. 6	Aug. 15	31	33	1.06	4.2	7.8	.03	2.1	24	7.0	10	.0	.0	116	.7	4.8	183	14	1.35

Aug. 16	Aug. 26	15	20	1.33	3.7	8.4	.1	3.6	30	8.8	12	.0	.0	160	.6	7.4	255	24	1.18
Aug. 27	Sept. 6	55	53	.96	5.6	10	.05	3.3	30	8.2	11	.0	.0	153	1.1	8.4	242	16	.90
Mean		141	163	1.20	18	8.5	.70	4.0	23	6.7	9.3	.0	.0	123	1.1	4.5	197	22	....
Per ct. of anhydrous residue		....	....	....	....	4.7	[d].4	2.2	12.7	3.7	5.2	.0	....	68.0	3.6	2.5	....	....	....

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[a] Analyses September 6 to November 5, 1906, by R. B. Dole; November 6, 1906, to April 1, 1907, by R. B. Dole and M. G. Roberts; April 2 to September 6, 1907, by Chase Palmer and M. G. Roberts.

[b] Gaging station at West Newton, Pa., 10 miles above.

[c] Omitted from the average.

[d] $Fe_2O_3+Al_2O_3$.

Summary of results of mineral analyses of surface waters for eastern United States.

Source of sample (river, except as noted).	Average mineralization (parts per million).															Chemical composition of mineral matter (per cent of anhydrous residue a).									
	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO₂).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO₃).	Bicarbonate radicle (HCO₃).	Sulphate radicle (SO₄).	Nitrate radicle (NO₃).	Chlorine (Cl).	Total dissolved solids.	Silica (SiO₂).	Oxide of iron (Fe₂O₃).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO₃).	Sulphate radicle (SO₄).	Nitrate radicle (NO₃).	Chlorine (Cl).
Alabama, Selma, Ala	141	100	0.72	.....	21	0.53	13	2.9	7.0	0.0	48	9.0	0.7	2.3	82	26.2	0.9	16.2	3.6	8.7	29.4	11.2	0.9	2.9
Allegheny, Kittanning, Pa	21	30	1.14	1.2	7.9	.13	14	3.0	11	.0	38	17	.7	14	87	9.1	.2	16.1	3.5	12.7	21.9	19.6	.8	16.1
Androscoggin, Brunswick, Me. a	.....	.....	.....	.....	9.0	b3.2	7.4	1.1	3.5	.....	.....	12	.....	2.3	42	18.6	b6.6	15.3	2.3	7.3	20.3	24.8	.....	4.8
Arkansas, Little Rock, Ark	755	748	.88	.....	28	.82	55	13	144	.0	148	93	2.0	203	630	4.6	.2	9.0	2.1	23.5	11.9	15.2	.3	33.2
Big Muddy, Murphysboro, Ill	245	129	.5	.....	24	2.1	25	12	20	.....	72	72	2.0	13	225	11.6	1.0	12.2	5.7	10.0	17.2	35.1	1.0	6.2
Big Vermilion, Danville, Ill	115	82	.8	.....	14	.29	54	25	13	.....	243	42	12	4.5	281	4.9	.1	19.0	8.8	4.6	42.1	14.7	4.2	1.6
Brazos, Waco, Tex	1,462	488	1.03	.....	22	.26	121	19	234	.0	158	279	2.2	338	1,136	2.0	.0	11.1	1.7	21.4	7.1	25.5	.2	31.0
Cache, Mounds, Ill	134	66	.6	.....	22	2.5	19	6.0	15	.....	85	19	2.1	6.8	149	16.4	1.9	14	4.4	11	30.7	14	1.5	5.0
Cahaba, Birmingham, Ala	40	32	.81	.....	16	.44	13	2.5	9.1	.0	52	8.8	.6	2.2	76	20.4	.8	16.6	3.2	11.6	32.7	11.2	.7	2.8
Cape Fear, Wilmington, N. C	73	21	.92	1.3	9.9	.78	5.0	1.5	7.2	.0	25	3.2	.2	5.8	57	21.6	2.4	10.9	3.3	15.7	26.1	7.0	.4	12.6
Cedar, Cedar Rapids, Iowa	64	61	.97	.....	14	.09	48	16	12	.0	209	30	3.1	3.4	228	6.1	.1	20.9	7.0	5.2	44.8	13.0	1.4	1.5
Chattahoochee, West Point, Ga	185	136	.71	.....	20	.47	4.8	.8	7.7	.0	23	4.5	.7	2.1	52	38.0	1.3	9.1	1.6	14.6	21.5	8.5	1.4	4.0
Chippewa, Eau Claire, Wis	7.0	3.7	.97	.....	12	.22	13	4.7	8.1	.0	48	14	.6	1.1	90	15.5	.4	16.8	6.1	10.5	30.5	18.0	.8	1.4
Colorado, Austin, Tex	.....	351	.....	.....	18	3.1	52	17	49	.0	195	42	.....	59	321	5.4	.9	15.5	5.1	14.6	28.5	12.5	.....	17.5
Cumberland:																								
Nashville, Tenn	126	94	.74	.....	20	.42	26	3.6	9.6	.0	92	14	1.2	2.1	119	16.4	.5	21.3	2.9	7.8	37.0	11.4	1.0	1.7
Kuttawa, Ky	176	165	.92	.....	18	.30	28	4.3	7.8	.9	100	9.7	1.8	3.0	124	14.6	.4	22.8	3.5	6.3	40.6	7.9	1.5	2.4
Dan, South Boston, Va	132	264	2.35	7.5	24	1.1	5.6	1.5	6.8	.0	33	3.4	1.1	3.2	71	38.0	2.5	8.9	2.4	10.7	25.3	5.4	1.7	5.1
Delaware, Lambertville, N. J	16	26	1.74	.6	9.0	.07	12	3.3	5.4	.0	46	12	1.1	2.9	70	13.1	.2	17.5	4.8	7.9	33.2	17.5	1.6	4.2
Des Moines, Keosauqua, Iowa	542	642	1.09	.....	22	.36	58	21	17	.0	216	71	3.3	4.8	312	7.2	.2	19.0	6.9	5.6	35.0	23.4	1.1	1.6
Embarrass:																								
Charleston, Ill	155	140	.9	.....	17	.34	51	24	13	.....	249	31	7.6	4.9	270	6.3	.2	18.8	8.9	4.8	45	11.4	2.8	1.8
Lawrenceville, Ill	118	66	.7	.....	17	.53	44	19	28	.....	195	35	3.7	35	283	6.1	.3	15.8	6.8	10.0	34.5	12.6	1.3	12.6
Erie, Lake, Buffalo, N. Y	41	Tr.	.....	.....	5.9	.07	31	7.6	6.5	3.1	114	13	.3	8.7	133	4.5	.1	23.4	5.7	4.9	44.8	9.8	.2	6.6
Flint, Albany, Ga	100	3	.67	.....	24	.86	8.8	1.4	a7.0	.0	31	c5.0	.5	2.8	57	35.8	b1.8	13.0	2.1	10.4	22.8	9.0	.9	4.2
Fox:																								
Elgin, Ill	34	23	.7	.....	12	.15	51	30	11	.....	268	38	2.4	5.2	290	4.3	.1	18.1	10.6	3.9	46.8	13.5	.9	1.8
Ottawa, Ill	94	87	1.2	.....	11	.20	60	32	14	.....	275	61	4.9	7.9	335	3.4	.1	18.4	9.8	4.3	41.4	18.7	1.5	2.4
Grand, Grand Rapids, Mich	37	43	1.61	1.1	14	.07	56	19	10	8.5	214	33	2.3	7.7	258	5.5	.0	21.9	7.4	3.9	44.5	12.9	.9	3.0
Hudson, Hudson, N. Y	13	16	1.26	.7	11	.15	21	3.8	7.9	.0	73	16	.8	4.0	108	10.9	.2	20.9	3.8	7.8	35.7	15.9	.8	4.0
Huron, Lake, Port Huron, Mich	Tr.	Tr.	.....	.....	12	.04	24	7.0	4.4	1.8	100	6.2	.4	2.6	108	11.1	.0	22.3	6.5	4.1	47.4	5.8	.4	2.4

Illinois:																							
La Salle, Ill	159	136	.8	.....	12	.21	50	22	16	.....	203	50	6.6	13	278	4.5	.1	18.6	8.1	5.9	37.0	18.6	2.4	4.8
Peoria, Ill	43	26	.8	.....	12	.21	49	21	17	.....	198	48	7.8	13	271	4.5	.1	18.5	7.9	6.4	36.7	18.1	2.9	4.9
Kampsville, Ill	188	145	.8	.....	12	.27	47	20	18	.....	202	42	4.3	15	267	4.6	.1	18.2	7.8	7.0	38.5	16.3	1.7	5.8
Iowa, Iowa City, Iowa	168	120	.80	.....	19	.25	49	17	14	.0	210	36	2.8	3.6	247	7.8	.1	20.0	6.9	5.7	42.2	14.7	1.1	1.5
James, Richmond, Va	90	71	.96	3.9	18	.5	14	3.0	6.7	.0	60	7.1	.3	2.3	89	22.0	.9	17.1	3.7	8.2	36.2	8.7	.4	2.8
Kalamazoo, Kalamazoo, Mich	7	19	2.64	.2	17	.05	55	18	8.2	7.8	216	2.3	1.9	3.4	242	7.1	.0	22.9	7.5	3.4	47.3	9.6	.8	1.4
Kankakee, Kankakee, Ill	50	32	.7	.....	15	.27	58	21	12	.....	215	57	4.1	4.9	288	5.4	.1	20.8	7.5	4.3	38.1	20.5	1.5	1.8
Kaskaskia:																							
Carlisle, Ill	184	126	.7	.....	17	.39	47	20	14	.....	213	34	4.8	6.9	248	6.8	.2	18.9	8.0	5.6	42.1	13.7	1.9	2.8
Shelbyville, Ill	110	84	.9	.....	16	.23	53	26	13	.....	262	34	6.9	5.6	279	5.6	.1	18.7	9.2	4.6	45.4	12.0	2.4	2.0
Kentucky, Frankfort, Ky	150	142	.93	4.7	16	.49	21	3.7	6.8	2.4	73	8.3	2.5	2.0	104	16.1	.7	21.1	3.7	6.9	38.6	8.4	2.5	2.0
Lehigh, South Bethlehem, Pa	14	21	2.46	1.2	8.8	.10	14	5.7	7.5	.0	40	30	2.2	4.9	95	9.5	.1	15.0	6.1	8.1	21.2	32.3	2.4	5.3
Little Vermilion, Streator, Ill	107	78	.7	.....	14	.22	55	29	18	.....	241	68	12	6.9	325	4.4	.1	17.1	9.0	5.6	36.9	21.1	3.7	2.1
Little Wabash, Carmi, Ill	135	68	.5	.....	26	2.0	20	9.1	15	.....	88	32	2.1	7.5	176	16.6	1.3	12.7	5.8	9.5	27.6	20.4	1.3	4.8
Maumee, Toledo, Ohio	143	112	.95	3.4	17	.27	57	16	24	2.5	173	48	4.5	40	298	5.8	.1	19.4	5.4	8.2	29.7	16.3	1.5	13.6
Miami, Dayton, Ohio	84	94	1.46	2.0	17	.15	59	24	9.0	5.8	244	40	8.6	4.1	289	5.9	.1	20.5	8.3	3.1	43.8	13.9	3.0	1.4
Michigan, Lake, St. Ignace, Mich	Tr.	Tr.	.....	.....	10	.04	26	8.2	4.7	2.9	112	7.2	.3	2.7	118	8.5	.0	22.2	7.0	4.0	49.6	6.1	.3	2.3
Minnesota, Shakopee, Minn	97	142	1.18	.....	23	.09	82	35	23	.0	296	144	2.0	4.7	480	5.0	.0	17.9	7.6	5.0	31.7	31.4	.4	1.0
Mississippi:																							
Minneapolis, Minn	10	7.9	1.13	.....	15	.07	40	14	10	.0	188	18	1.4	1.6	200	7.8	.1	20.8	7.3	5.2	48.0	9.3	.7	.8
Moline, Ill	117	106	.9	.....	16	.39	33	13	10	.....	152	24	1.8	3.7	179	9.0	.3	18.7	7.3	5.7	42.3	13.6	1.0	2.1
Quincy, Ill	173	119	.8	.....	18	.46	36	16	11	.....	175	25	2.2	4.4	203	8.8	.3	19.1	7.7	5.2	42.9	12.9	1.2	1.9
Chester, Ill	858	634	.8	.....	22	.39	44	16	21	.....	174	56	2.7	9.8	269	8.5	.2	17.1	6.2	8.2	33.2	21.8	1.0	3.8
Memphis, Tenn	556	519	.97	.....	24	.61	36	12	19	.0	129	43	1.7	8.6	202	11.5	.4	17.3	5.7	9.1	30.5	20.6	.8	4.1
New Orleans, La	......	....	......	.....	11	[b].53	32	8.4	13	.0	111	24	2.5	9.7	166	7.1	[a].6	20.6	5.4	8.4	34.7	15.4	1.6	6.2
Missouri:																							
Florence, Nebr	1,726	2,059	1.16	.....	31	.44	65	20	49	.0	203	168	1.8	8.9	454	7.0	.2	14.6	4.5	11.0	22.5	37.8	.4	2.0
Kansas City, Kans	1,909	2,032	1.04	.....	37	.73	62	18	44	.0	202	135	2.2	13	426	9.0	.2	15	4.4	10.7	24.2	32.8	.5	3.2
Ruegg, Mo	1,931	1,890	1.02	.....	29	.51	52	16	36	.0	178	104	2.9	12	346	8.5	.2	15.3	4.7	10.6	25	30.6	.8	3.5
Monongahela, Elizabeth, Pa	82	84	1.11	3.7	8.4	.49	12	2.2	7.3	.0	18	33	1.8	3.2	81	10.8	.9	15.5	2.8	9.4	11.5	42.6	2.3	4.2
Muskingum, Zanesville, Ohio	96	70	1.71	3.2	14	.18	43	9.5	23	1.3	115	43	1.6	40	244	6.0	.1	18.5	4.1	9.9	25.0	18.5	.7	17.2
Neuse, Raleigh, N. C	78	68	.79	2.8	26	1.4	5.9	1.8	7.9	.0	35	3.4	.3	4.4	73	37.7	2.9	8.6	2.6	11.5	25.0	4.9	.4	6.4
North Platte, North Platte, Nebr	307	311	.95	.....	40	.26	46	12	32	.0	165	76	1.2	6.9	295	13.5	.1	15.6	4.1	10.8	27.5	25.7	.4	2.3
Oconee, Dublin, Ga	208	171	.78	.....	21	.68	8.5	1.6	8.8	.0	37	6.2	1.0	3.4	68	30.2	1.4	12.2	2.3	12.6	26.1	8.9	1.4	4.9
Ocmulgee, Macon, Ga	230	174	.72	.....	26	.9	6.3	1.2	8.3	.0	28	4.9	.7	2.8	69	39.8	2.0	9.6	1.8	12.7	21.2	7.5	1.1	4.3
Oostanaula, Rome, Ga	128	109	.80	.....	24	.7	12	2.6	9.2	.0	53	4.1	.4	1.8	82	29.6	1.2	14.8	3.2	11.3	32.2	5.0	.5	2.2
Oswegatchie, Ogdensburg, N. Y	8	10	1.38	.7	9.4	.21	13	3.5	5.3	.0	53	8.2	.4	.4	77	14.1	.4	19.5	5.3	8.0	39.2	12.3	.6	.6
Pearl, Jackson, Miss	56	46	.93	.....	18	.37	7.1	1.1	8.9	.0	32	6.4	.7	3.4	59	29.1	.8	11.5	1.8	14.4	25.5	10.3	1.1	5.5
Pedee, Peedee, N. C	131	94	.76	.....	26	.31	6.9	1.3	8.9	.0	32	4.0	.6	3.1	69	38.8	.7	10.3	1.9	13.3	23.6	6.0	.8	4.6
Platte:																							
Columbus, Nebr	374	300	.81	.....	32	.20	63	18	48	.0	186	152	1.3	14	437	7.6	.1	15.0	4.3	11.4	21.8	36.2	.3	3.8
Fremont, Nebr	379	392	1.03	.....	47	.26	47	11	30	.0	178	66	1.0	6.4	302	15.9	.1	15.9	3.7	10.1	29.6	22.3	.3	2.1
Potomac, Cumberland, Md	28	29	1.59	3.0	8.2	.14	24	4.6	9.0	.0	36	58	.9	6.4	130	6.4	.2	18.6	3.5	7.0	13.7	45.0	.7	4.9
Raritan, Boundbrook, N. J	37	36	1.16	1.2	16	.15	12	3.9	9.1	.0	51	12	1.9	4.7	85	18.8	.3	14.1	4.6	10.7	29.6	14.1	2.3	5.5
Red, Shreveport, La	790	870	1.11	.....	30	1.1	74	17	90	4.6	135	140	.4	121	561	5.5	.3	13.6	3.1	16.5	13.1	25.7	.0	22.2

[a] Based on the assumption for anhydrous residue that the average content of bicarbonates is 20 parts.

[b] $Fe_2O_3+Al_2O_3$.

[c] Approximate.

Summary of results of mineral analyses of surface waters for eastern United States—Continued.

Source of sample (river, except as noted).	Average mineralization (parts per million).															Chemical composition of mineral matter (per cent of anhydrous residue).									
	Turbidity.	Suspended matter.	Coefficient of fineness.	Total iron (Fe).	Silica (SiO_2).	Iron (Fe).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Bicarbonate radicle (HCO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).	Total dissolved solids.	Silica (SiO_2).	Oxide of iron (Fe_2O_3).	Calcium (Ca).	Magnesium (Mg).	Sodium and potassium (Na+K).	Carbonate radicle (CO_3).	Sulphate radicle (SO_4).	Nitrate radicle (NO_3).	Chlorine (Cl).
Reservoir:																									
Cartter, Ill	72	33	.5	.....	16	1.9	9.0	3.6	8.6	.....	34	16	2.1	5.2	92	20.3	2.4	11.4	4.6	10.9	21.0	20.2	2.6	6.6
Cypress, Ill	155	59	.5	.....	29	3.7	18	7.0	13	.....	67	33	2.2	6.8	165	19.9	2.5	12.4	4.8	8.9	22.6	22.7	1.5	4.7
Joppa, Ill	116	66	.5	.....	22	3.5	10	4.0	9.0	.....	43	19	1.9	4.3	111	23.2	3.7	10.5	4.2	9.5	22.4	20.1	2.0	4.4
Marion, Ill	97	43	.5	.....	13	.93	15	8.2	17	.....	51	45	1.7	8.3	140	9.7	.7	11.2	6.1	12.6	18.7	33.5	1.3	6.2
Rio Grande, Laredo, Tex	2,475	.....	.....	.....	29	3.6	104	23	119	.0	178	228	.....	164	791	3.8	.5	13.7	3.0	15.7	11.6	30.1	.....	21.6
Roanoke, Randolph, Va	169	127	.....	7.7	21	.95	9.5	3.5	5.9	.0	53	4.4	.5	2.2	79	28.2	1.8	12.8	4.7	7.9	35.1	5.9	.7	3.0
Rock:																									
Rockford, Ill	134	92	.7	.....	15	.44	45	25	10	.....	252	22	4.1	4.6	250	6.0	.2	18.0	10.0	4.0	49.6	8.8	1.6	1.8
Sterling, Ill	229	236	1.2	.....	15	.31	49	27	12	.....	263	25	3.8	5.5	267	5.6	.2	18.3	10.1	4.5	48.4	9.4	1.4	2.1
St. Lawrence, Ogdensburg, N. Y	4.5	Tr.	.....	.....	6.6	.05	31	7.2	6.3	2.9	116	12	.3	7.7	134	5.0	.1	23.6	5.5	4.8	45.7	9.2	.2	5.9
Saluda, Columbia, S. C	72	54	.71	.....	21	.38	8.4	1.3	a6.0	.0	33	a5.0	.43	3.5	62	33.6	.9	13.5	2.1	9.6	26.0	8.0	.7	5.6
Sangamon:																									
Decatur, Ill	126	87	.7	.....	19	.27	55	26	14	.....	268	35	8.5	5.4	293	6.4	.1	18.7	8.8	4.7	44.7	11.9	2.9	1.8
Springfield, Ill	74	39	.8	.....	16	.32	52	24	16	.....	247	37	3.4	7.5	276	5.8	.1	18.7	8.6	5.8	43.8	13.3	1.2	2.7
Chandlerville, Ill	154	102	.7	.....	15	.32	52	25	15	.....	255	36	6.1	7.6	282	5.3	.1	18.4	8.8	5.3	44.4	12.8	2.2	2.7
Savannah, Augusta, Ga	172	142	.77	.....	23	.44	5.7	.8	12	.0	30	6.0	.6	2.1	60	35.0	.9	8.7	1.2	18.3	22.6	9.1	1.0	3.2
Shenandoah, Millville, W. Va	31	39	1.64	.9	15	.08	32	8.2	6.7	1.3	132	6.2	2.6	3.0	140	10.7	.1	22.8	5.9	4.8	47.3	4.4	1.9	2.1
Superior, Lake, Sault Ste. Marie, Mich	2	Tr.	.....	.....	7.4	.06	13	3.1	3.2	.0	56	2.1	.5	1.1	60	12.7	.2	22.4	5.3	5.5	47.5	3.6	.9	1.9
Susquehanna:																									
West Pittston, Pa	14	22	4.00	1.0	10	.12	18	3.4	6.3	.0	63	14	1.5	4.2	90	11.3	.2	20.4	3.8	7.1	35.0	15.8	1.7	4.7
Williamsport, Pa	10	18	2.23	.9	7.6	.11	12	3.4	6.0	.0	28	26	.7	4.0	74	10.3	.2	16.3	4.6	8.1	18.8	35.3	1.0	5.4
Danville, Pa	16	21	1.73	.8	8.7	.09	21	4.6	8.9	.0	54	31	3.4	8.1	112	7.7	.1	18.7	4.1	7.9	23.7	27.6	3.0	7.2
Tennessee:																									
Knoxville, Tenn	204	156	.81	.....	25	.54	22	4.3	8.2	.0	86	6.4	.8	9.6	122	21.0	.6	18.4	3.6	6.9	35.5	5.4	.6	8.0
Gilbertsville, Ky	153	127	.90	.....	20	.39	19	4.1	7.7	.0	72	11	1.2	3.0	101	19.6	.6	18.6	4.0	7.5	34.8	10.8	1.2	2.9
Tombigbee, Epes, Ala	126	100	.82	.....	25	.63	18	1.8	10	.0	67	6.3	.6	3.0	94	25.4	.9	18.3	1.8	10.1	33.5	6.4	.6	3.0
Wabash:																									
Logansport, Ind	132	117	.85	.....	14	.23	82	35	142	.0	234	79	5.9	292	807	1.8	.0	10.7	4.6	18.5	15.1	10.3	.8	38.2
Vincennes, Ind	172	193	1.20	.....	13	.24	61	22	25	.0	230	55	6.4	36	336	3.9	.1	18.4	6.6	7.5	34.1	16.6	2.0	10.8
Wateree, Camden, S. C	259	214	.79	.....	25	.28	6.3	1.8	8.4	.0	34	4.2	.4	2.8	73	37.9	.6	9.5	2.7	12.7	25.4	6.4	.6	4.2

White:																								
Azalia, Ind	52	48	1.18	.....	15	.14	61	23	9.5	.0	276	30	5.6	3.1	279	5.3	.1	21.5	8.1	3.3	48.0	10.6	2.0	1.1
Indianapolis, Ind	39	38	1.04	.....	14	.15	74	29	48	.0	291	58	6.1	78	450	3.1	.0	16.4	6.4	10.7	31.8	12.9	1.4	17.3
Wisconsin, Portage, Wis	7	4.6	.86	.....	13	.22	14	6.8	8.1	.0	58	17	.9	2.1	98	1.43	.3	15.4	7.5	8.9	31.5	18.8	1.0	2.3
Youghiogheny, McKeesport, Pa	141	163	1.20	18	8.5	[b]4.70	23	6.7	9.3	.0	0	123	1.1	4.5	197	4.7	[b]2.6	12.7	3.7	5.2	.0	68	.6	2.5

Approximate.

[b] $Fe_2O_3+Al_2O_3$.

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