UNIVERSITY OF ILLINOIS

CHEMICAL SURVEY OF THE WATER SUPPLIES OF ILLINOIS.

PRELIMINARY REPORT

BY

ARTHUR WILLIAM PALMER, Sc.D.,
PROFESSOR OF CHEMISTRY.

Bull. 1

PUBLISHED BY THE UNIVERSITY.
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PRELIMINARY REPORT

OF THE

CHEMICAL SURVEY

OF THE

WATERS OF THE STATE OF ILLINOIS

Andrew Sloan Draper, LL.D.,
President of the University of Illinois,

SIR:—The chemical survey of the waters of the State, instituted for the purpose of making systematic chemical investigations of the water supplies of Illinois, was begun in the latter part of September, 1895, and, with the exception of a short interruption due to the destruction of our laboratories by fire last August, has been in continuous progress until the present time.

The aims of the survey include the determination of the present sanitary condition of the water supplies drawn from the lakes, the streams, and the wells of the State; the determination of the normal condition of the uncontaminated waters; the formulation of local standards of purity based upon the results of analyses of water derived from unpolluted sources; the provision of such means as shall afford to citizens of the State opportunity to obtain immediate information regarding the wholesomeness of the potable waters in which they are directly interested; and the prevention of the development and dissemination of disease from use of impure water.

That an abundant supply of wholesome drinking water is a most important factor in the preservation of health, while impurities in the water constitute a most potent means of developing and spreading disease, are propositions the essential truth of which is not questioned by physicians or scientists, and is coming to be quite generally understood and accepted by the public.

The available sources of water supply in this State are practically limited to rain water, low-land surface water furnished by streams and lakes, and groundwaters obtained from wells of greater or less depth.

The water derived from each of these sources differs very widely in character from those derived from the others, and again within each of these classes, including even the first, we find the widest variation in character and quality, the result usually of local conditions.

"Water from the heavens," if caught in its original condition and so preserved, doubtless constitutes the purest water which nature affords. Such water, however, is but rarely obtained, because the care and attention involved in the attainment and maintenance of the requisite conditions are not often devoted to the purpose, nor even generally recognized as necessary.

Rain in falling to the earth washes from the air some or all of the various impurities which the atmosphere contains, so that the water precipitated during the forepart of a rain storm usually contains considerable quantities of foreign substances both mineral and organic. In addition to the objectionable gases emanating from fires, from manufacturing establishments, from decomposing refuse matters, etc., these impurities include numerous solid substances of which the most important are soot, dust, and various sorts of germs. Furthermore, the roofs which serve as collecting surfaces are usually soiled with soot, dust blown from the roadways, the excrement of birds, decaying leaves, etc. The rain water which is collected during the latter part of the shower, after the air and the roof have been thoroughly washed, is comparatively pure; nevertheless, it still contains small quantities of foreign substances which accumulate and become a dangerous menace to health, unless the cistern, and especially the filter, be kept scrupulously clean. The ordinary cistern filter, is almost worse than useless, inasmuch as it soon becomes charged with the matters which it has removed from the water and then merely clarifies without thoroughly purifying the water which subsequently passes through.

In general, water taken from lakes, from streams, or from the ground, when these are in their original or natural

condition, is perfectly wholesome and unobjectionable; but with increasing population and longer occupancy of the ground, the conditions change.

Our water courses are natural drainage channels; they receive the drainage of all towns and villages situated within their respective watersheds, so that most of our streams now consist of diluted sewage.' The ground in towns and villages is honeycombed with privy vaults, cess-pools, and loose-jointed drains, and everywhere the soil is more or less covered with refuse matters of vegetable and of animal origin, of which the proportion represented by barnyards, pigpens, and the like, comes far from telling the whole story.

In the case of surface waters— *i. e.*, lakes and streams— visual knowledge of their contamination by sewage, accentuated by widespread knowledge of almost innumerable instances of destructive epidemics which have resulted directly from the use of such waters in their polluted condition, arouses public attention to the need of improvement.

As is well known, the recurrence of epidemics of cholera, typhoid fever, and other zymotic diseases, have almost invariably been prevented wherever the causes have been abolished, either by diverting the sewage from access to the source of water supply, or, where this is impracticable, by proper filtration of the polluted water. The importance attached to the attainment of such improvements by the people directly interested is sufficiently evidenced by the enormous expense which the citizens of Chicago have assumed in providing the great drainage canal for the purpose of avoiding the necessity of drinking the sewage of the city diluted with lake water.

With respect to ground waters, the public is not in general so well informed, otherwise the use of privy vaults, cess-pools, and shallow wells, in close proximity to each other, would be no longer tolerated. That such things are still permitted to exist side by side in our towns, villages, -and country places, is doubtless due to certain popular misconceptions touching the functions and powers of the soil. Earth is commonly regarded as an excellent purifier, and justly so; but the purifying power of the soil is not unlimited, and the earth itself may become contaminated by that which it seems to render innocuous, but which in many instances it merely conceals from our senses.

Filtration of polluted water, in order that it be effective, must be in some degree intermittent, that is, the filtering-material must be frequently renewed, either by replacement. or by exposure to the air. This principle, the basis of successful practice in management of filtration plants for the purification of polluted water supplies, and likewise the basis of modern methods of sewage disposal by irrigation, is not generally apprehended by those who depend for their water supply upon shallow wells, although it applies with equal force to the process of sojl-filtration upon which they place reliance for the removal of all objectionable matters from the liquids which find their way through the soil to the wells. Because the water from such wells is in general clear, sparkling, cool, and of agreeable taste, it is commonly supposed that it is wholesome; and the continued use of such water for drink during many years is frequently cited as argument in their favor. It must be remembered that sewage from healthy sources may, in a diluted state, be drank with impunity; but while very few people would *choose* to do this, yet multitudes do so unwittingly in their use of well water.

The greatest danger lies in the fact that the sewage may at any time receive dejecta from diseased beings, and the well consequently become the means of distributing the disease.

Although matters which are offensive to the senses are commonly either mechanically removed or are oxidized, or are otherwise rendered innocuous during the passage of sewage-laden waters through the soil, yet the danger instead of being lessened is frequently increased by reason of the false security which this apparent purification engenders.

Germs in general, but more particularly those germs which are the specific cause of disease, are much less readily affected, and are known to pass for considerable distances through soil strata and to remain in the palatable but deadly infusion from which most of the other organic substances-have been removed.

Contamination of the water supply may occur in the most unsuspected ways. Frequently, water bearing strata which supply wells or springs so situated as to be free of any possible local contamination, outcrop at a distance, but at places where the surface is polluted. Cases are known of wells which in this way are fed by the rains which fall in a city several miles away, so that while the immediate environment of the wells is favorable, yet the water yielded is unwholesome by reason of its containing the washings of the town, which sinking into the ground at the outcrop in the city, may be drawn from the country well for use as drink.

Contrary to former belief, even the water drawn from deep driven wells may contain numerous germs, as has been recently shown by the Massachusetts State Board of Health.

Numerous instances of the dissemination of disease to the extent of producing great loss of life by epidemics, by the use of well or spring waters which were highly prized because of pleasant appearance and taste, are to be found recorded in sanitary literature.

The facts involved in the foregoing statements are well understood by physicians and scientists, and are so thoroughly recognized by boards of health, that most of the greater municipalities have provided means for the examination and control of water supply, and the disposition of sewage. The department of health of the city of Chicago, in establishing a municipal laboratory, has provided for the vigilant inspection and the constant investigation of the water supplied to the people of the metropolis. In a number of the larger towns of the Statethe water supply is occasionally made the subject of a sanitary examination, but no extensive investigations of the ground waters of this State have hitherto been made; although, contrary to popular belief, diseases arising from, or distributed by, impurities in the water supply are much more prevalent in the smaller towns and the cpuntry districts than in the large cities, as has been shown especially by the study of typhoid fever in New York and Massachussetts, the two states in which the investigations of these subjects have been most thorough-going and complete.

In establishing the chemical survey of the waters of the State, the trustees of the University, made provision for the examination into the sanitary condition of any. drinking waters used by the citizens of Illinois, and there is thus afforded opportunity for protection of the inhabitants of the towns, the villages, and the rural districts, from the unwitting use of impure drinking water and the attendant consequences.

EQUIPMENT.

In order that the sanitary chemical analysis of waters shall yield results which shall be accurate and of value, the work must be conducted in special laboratories, so situated that they may not be reached by the fumes which are an. unavoidable accompaniment of the work of a general chemical laboratory, because, many of the tests would otherwise be ruined. For the work of the survey, accordingly, special quarters were fitted up and provided with all the necessary facilities for sanitary water analysis. The general laboratory supplies of the University were drawn upon for all ordinary stock apparatus and chemicals, but such special appliances as are required for the rapid and accurate analysis of numerous samples of water were provided from the funds appropriated for the purposes of the survey. A general idea of the fittings of the special laboratory may be had from the illustrations at the end of the book.

THE CHEMICAL EXAMINATION OF WATERS.

The general purpose of the chemical analysis of potable waters is well understood by the public to be intended in some way for the determination of the question of their purity and wholesomeness, but nevertheless, much misconception exists regarding the method of arriving at an opinion, and the significance of the analytical data. It must be understood that the results of a chemical examination.of a water are not in themselves sufficient to indicate the character of the water in any ordinary case. In the assay of silver ore, the determination of the quantity of silver is all that is necessary, for the value of the ore depends directly on the amount of the precious metal contained, and this is directly

represented by the analytical result. The data resulting" from a water analysis, on the other hand, require interpretation, and it is essential that the one who is to interpret shall have complete information regarding the history of the water, its source, the surroundings; also, in case of a well, the nature of the strata from which the water comes, as well as the overlying strata, and, in fact, as complete information as it is possible to obtain. Even with this information, the formation of a correct conclusion is in many cases a difficult matter, and is ordinarily entirely beyond the powers of the layman.

A wholesome water from a certain source may contain such quantities of the various constituents as would, if found in the water from a different source, serve to entirely condemn the latter. The significance of the results depends usually directly upon the source of the water.

Further, certain substances, the determination of which is most important. are present usually in but minute quantity in potable waters, and their quantity is very easily increased by the use of improper methods and vessels in taking the sample. Some of the constituents of the water readily change on standing, especially if the sample becomes warm and is exposed to the light. Accordingly, in providing for the chemical examination of waters for the citizens of the State, it was necessary to make certain that the samples should be collected with tbe utmost care and in vessels properly cleaned, as otherwise the results of the analyses would be valueless. In the case of each collection which is to be made, whether it is a part of our general survey or at the request, and for the immediate information and benefit of individual citizens of the State, our method of general procedure has been the same, and is based upon the plan so successfully followed by the Massachusetts State Board of Health in their work upon the waters of Massachusetts.

Glass stoppered bottles of one gallon capacity are used for collections. These are cleaned by means of a solution of potassium bichromate in diluted sulphuric acid, then rinsed with fresh ammonia-free distilled water, drained. and the stoppers secured in place by being covered with clean canvas tied down tightly. The bottles are then packed in wooden cases with open tops and shipped to the collector. An envelope shipping tag containing printed directions for the collection of the sample and a blank certificate to be filled out by the collector with all necessary information concerning the sample, is tied to the neck of each bottle. The directions and certificates used are as follows:

CHEMICAL LABORATORY UNIVERSITY OP ILLINOIS.

INSTRUCTIONS FOR COLLECTING SAMPLES OF WATER FOR ANALYSIS.

1. *From a Well.* Water should be pumped out freely for a few minutes before it is collected. The bottle is then to be placed in such position that the water from the spout may fall directly into it, and rinsed out with the water three times, pouring out the water completely each time. It is then again to be placed under the spout, filled to overflowing, and a small quantity poured out, so that an air space of about an inch shall be left under the stopper. The stopper must be rinsed off with flowing water, inserted into the bottle while still wet, and secured by tying over it a clean piece of cotton cloth. The ends of string must be sealed on top of the stopper. *Under no circumstances must the inside of the neck of the bottle or the stem of the stopper be touched by the hand or wiped with a cloth.*

2. *From a Tap.* Allow the water to flow freely from the tap for a few minutes, and then proceed precisely as directed above.

3. *From a Stream, Pond, or Reservoir.* The bottle and stopper should be rinsed with the water, if this can be done without stirring up the sediment on bottom. The bottle, with the stopper in place, should then be entirely submerged in the water and the stopper taken out, at a distance of twelve inches or more below the surface. When the bottle is full, the stopper is replaced (below the surface, if possible,) and finally secured as above. It is important that the sample should be obtained free from the sediment at the bottom of a stream and from the scum on the surface. If a stream should not be deep enough to admit of taking a sample in this way, the water must be dipped up with an absolutely clean vessel and poured into the bottle after it has been rinsed. *The sample of water should be collected immediately before shipping by express, so that the shortest possible time shall intervene between the collection of sample and its examination.*

The accompanying "Certificate" must be filled out carefully and enclosed in the envolope shipping tag.

CERTIFICATE.

Fill out carefully and enclose in the envelope tag addressed to the University of Illinois Chemical Laboratory, Champaign, Ill.

SAMPLE OF WATER.

From ....
Name of Town.

Collected and sealed by..
Name and Address of Collector.

....

Collected from...
State whether the water is from a stream, pond, reservoir, well, tap, or other source.

....
If drawn from a tap, state also original source of water.

Collected on..
Give day, date, and hour of day.

Shipped by.............................Express...
Company. Give date and hour of day.

Bemarks.—In case of any abnormal or unusual conditions existing In the source of the water, mention the facts; as, for instance, if the wells, streams, or ponds are very full, or swollen by recent heavy rains, or other cause; or are unusually low in consequence of prolonged drouth; or if there is a great deal of vegetable growth in or on the surface of the water. Write on other side of this certificate.

Note.—The data resulting from an analysis are generally unintelligible to the layman. If an interpretation of the results and certificate as to condition of the water is desired, the fullest possible information concerning the source of water, surroundings, conditions, etc., must be forwarded with the sample.

If from a well, state depth of well....................; height of water...................

Character of soil and of strata from which water is drawn...................

Sort of well, *i. e.*, driven or dug, cased up, cemented or not, etc............

Proximity, and sort, of drains, cess-pool, outhouses, etc.....................

Any ground for suspicion..

Regular analyses of the waters have included determination of turbidity, sediment, color, odor, residue on evaporation, loss on ignition, nitrogen in the four different states—that is, nitrogen as free or saline ammonia, nitrogen as albuminoid ammonia, nitrogen as nitrites, nitrogen as. nitrates; chlorine contained as chlorides, and oxygen consumed.

In the case of turbid waters, which have usually come from the rivers, we have made similar determinations, both with the water in its original condition and with the water • after it has been filtered, in order to distinguish between constituents contained in solution and those merely held in[1] suspension. In some cases determination of the hardness has been made, and in a few cases, determination of the dissolved gases and of the degree of alkalinity. Since January, 1896, we have made determinations of the total organic nitrogen in the waters obtained from streams and certain other sources in the State, in addition to the determination of nitrogen as albuminoid ammonia.

As part of the general study of the waters of the streams of the State, we have made a considerable number of determinations of the quantity of phosphorus contained as phosphates, etc., with the purpose of noting, if practicable, the relation between chlorine and phosphorus in normal and in polluted waters.

In addition to the sanitary analysis we have occasionally made complete quantitative analysis of the mineral , matters contained in the waters, but in most cases the work has been of necessity limited to the former.

METHODS OP ANALYSIS.

Immediately on reception of the sample at the laboratory, determinations of those substances which are susceptible of rapid change are started. The cloth which covers the stopper having been removed, the stopper and neck of the bottle cleaned, the contents thoroughly shaken in order to mix them completely and a little of the water poured out in order to rinse off the lip, then the portions of the sample required for the various determinations are imme-

diately measured out. The determinations are made in order as follows:

NITROGEN AS NITRITES.—Fifty cubic centimeters of the water are placed in a Nessler tube, one cubic centimeter of an acid solution of naphthylamine hydrochloride (8,grams of naphthylamine, 8 cubic centimeters of strong hydrochloric acid, and 992 cubic centimeters of water) and one cubic centimeter of a saturated solution of sulphanilic acid in water containing five per cent strong hydrochloric acid are added, and the mixture allowed to stand for one hour. If no color has developed in this length of time the sample is considered to be free of nitrites. If a color appears then parallel tests are made for the determination of the quantity by comparison with tints produced by known quantities of dilute standard solution of sodium nitrite.

Standard solution of sodium nitrite is prepared from pure silver nitrite by reaction with sodium chloride, and is made in two strengths, one solution containing in one cubic centimeter the equivalent of .005 milligram of nitrogen, the other .0005 milligram of nitrogen. Waters which are very turbid or deeply colored are clarified and decolorized by treatment with aluminium hydroxide before testing for nitrites.

NITROGEN AS NITRATES.—Determination of nitrates also is begun immediately, the aluminium reduction method being used in the estimation. Fifty cubic centimeters of the water are treated with two cubic centimeters of nitrogen-free sodium hydroxide solution of thirty-three per cent strength. Two grams of aluminium in the form of a thin strip of foil are then introduced and the tube and contents allowed to stand over night in a moderately warm place. The reducto ammonia is ordinarily complete when the examinations . are continued next morning. According to the amount of nitrates contained in the water, from two to ten cubic centimeters of the reduced solution are employed for nesslerization. Usually after standing over night, the liquid in the upper part of the tube is perfectly clear and colorless and may be directly pipetted off for use. In case it is not clear it is commonly filtered through paper which has been freed of ammonia by washing with ammonia-free water; a measured quantity diluted to fifty cubic centimeters with nitrogen-free water is then nesslerized as in the free ammonia determination. In some cases clear colors have not been developed by this method of nesslerization, and we have found it necessary to distill off the free ammonia produced by the reduction of the nitrites and nitrates and to determine the ammonia in the distillate; correction is of course made for saline ammonia originally contained in the water and that produced by the reduction of the nitrites present. In cases where much free ammonia is contained in the water sample which is being examined, this is removed before reducing. For this purpose a proper amount of sodium hydroxide solution is added and the mixture boiled rapidly to about one-third its volume, the final volume being brought up to fifty cubic centimeters again by the addition of nitrogen free water; then the reduction and subsequent determination is conducted as above. When nitrates are present in very small quantity a greater volume of water is used, but after being made alkaline it is concentrated to . fifty cubic centimeters before reducing. If large quantities of nitrates are present, five or ten cubic centimeters of the. sample are used after diluting to fifty cubic centimeters with nitrogen-free water.

FREE AND ALBUMINOID AMMONIA.—In the determina-. tion of free or saline ammonia we have used round bottom flasks of eight to nine hundred cubic centimeters capacity of the special ware of Schott & Genossen. These are supported upon an asbestus ring and heated by direct applications of the Bunsen flame. With the flasks we have used either cork or pure gum stoppers, and we make attachment to the condensers by means of a modified form of Reitmair & Stütsen's safety bulb, as designed by Hopkins. Our condensers consist of block tin tubes of three eighths inch internal diameter, with a cooling surface twenty inches in length. The tubes pass through a galvanized iron tank through which a constant current of cold water is kept flowing.

The apparatus is thoroughly steamed out until free of ammonia before each determination. Five hundred cubic centimeters of the water are used for the distillation, and ordinarily with waters containing little free ammonia, the

collection of the distillate is made in Nessler tubes, the boiling being conducted at such a rate that each tube is filled in from eight to ten minutes. In some of the river waters and in many of the deep well waters which we have had to exatnina, very considerable quantities of free or saline ammonia are contained. In such cases we catch the distillate in flasks of two hundred cubic centimeters capacity and determine the amount of ammonia in an aliquot portion of this, after diluting to the mark and thoroughly mixing. The residue after distillation of the free ammonia is used for the determination of the albuminoid ammonia in the ordinary way. The apparatus and contents having been somewhat cooled, fifty cubic centimeters of the alkaline permanganate solution are added through a funnel in order to avoid contact of the solution with the neck of the flask, and the distillation proceeded with at the same rate as for free ammonia. The collection of the distillate is ordinarily made in Nessler tubes, but in some few cases where much albuminoid matter is present we have caught the distillates in flasks as above described for the free ammonia.

Our standard ammonium chloride solution is made of such strength that one cubic centimeter shall contain ammonium chloride corresponding to one one-hundredth of a milligram of nitrogen, and the results of our determinations of all nitrogenous constituents of waters are stated in parts of nitrogen.

In conducting the nesslerization, care is taken that the distillates and standards are all of the same temperature before adding the Nessler reagent. Commonly, distillates obtained in the afternoon are allowed to stand in a cool place until the next morning before proceeding with the nesslerization. Twenty minutes is allowed for the development of the full color after the addition of the reagent, and the readings are taken within an hour.

The Nessler tubes which we employ are of colorless glass, of capacity fifty cubic centimeters and of length 7| inches to the mark.

Standards of comparison in nesslerization are made of the following strengths—*i*. e., the quantities of standard ammonium chloride solution used are: 0.05, 0.1, 0.2, 0.4, 0.6, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5 and 5.0 cubic centimeters. The camera used in the determination of the comparison consists of a black wooden box which cuts out all side lights, the tubes being illuminated from the bottom by means of a mirror reflecting the light from the northern sky, and the reading is made by means of another mirror placed above the tubes and so arranged as to bring the image direct to the eye of the observer. This apparatus has been in use in the laboratories of the University of Illinois for eleven years, and has always given admirable service.

TOTAL ORGANIC NITROGEN.—We have considered it important, especially in the case of surface waters and waters of some deep wells, to determine the total organic nitrogen as well as the albuminoid ammonia. The estimation is made by the Kjeldahl process, as follows:

Five hundred cubic centimeters of the water are distilled as usual for the removal of free ammonia. To the residue in the flask from which the distillation has been made, ten cubic centimeters of pure nitrogen-free sulphuric acid are added, and the flask so shaken that its sides are thoroughly wetted and washed down by the acid solution. The flasks are then placed in an inclined position over wire gauze and the solution heated until the water is all expelled and the concentrated sulphuric acid becomes white. After cooling, two hundred cubic centimeters of ammonia-free water are added, and then one hundred cubic centimeters of strong, nitrogen-free sodium hydroxide solution, the flask being immediately connected with the condenser, the contents mixed by thorough shaking, and the distillation, which is conducted at first very slowly, is continued until one hundred and fifty to two hundred cubic centimeters have distilled over. The distillate caught in quarter-liter flasks, is diluted to the mark with ammonia-free water, and after thoroughly mixing, an aliquot portion of this is employed for the usual nesslerization. Commonly a little dilute, nitrogen-free hydrochloric acid has been placed in the receiver to insure the complete fixing of the ammonia vapors which come over somewhat freely in the first portions of the distillate.

CHLORINE.—For the chlorine determinations we use the ordinary process of titration with silver nitrate solutioD. The standard solution is of such strength that one-tenth of a cubic centimeter represents one part of chlorine in a million parts of water when fifty cubic centimeters of the water are taken for the determination. Many of the waters with which we have had to do, contain so little chlorine that it is necessary to concentrate them; in such cases, whatever the quantity taken, the volume has been brought to fifty cubic centimeters for the determination. The indicator used is potassium chromate solution, of which one cubic centimeter of five per cent strength is brought into the liquid to be tested; the end point is in all cases determined by comparison with a blank test.

OXYGEN CONSUMED, we determine as follows:

One hundred cubic centimeters of the water are measured into an Erlenmeyer flask of two hundred and fifty cubic centimeters capacity, two cubic centimeters of pure concentrated sulphuric acid are added, and then ten cubic centimeters of standard potassium permanganate solution. The mixture in the flask is then placed in boiling water, and so heated continuously for thirty minutes. Proceeding in this way, the temperature within the flask is brought almost to that of the water, which is kept briskly boiling, in the bath itself, and any considerable concentration by evaporation of the water in the flask, as also "bumping," which frequently results in the loss of the sample, is entirely avoided. At the end of thirty minutes' digestion, the flask is removed and exactly ten cubic centimeters of standard ammonium oxalate solution is added. When the solution has become perfectly colorless, standard potassium permanganate solution is run in until the development of a faint pink color indicates that the end point is reached. As the ammonium oxalate solution and the permanganate solution are of equivalent strength, we need only consider the permanganate used in the titration. The strength of the reagent is such that one cubic centimeter of potassium permanganate solution used in the titration represents one part of oxygen consumed in one million parts of water, when one hundred cubic centimeters of the water sample has been taken for the determination.

In some cases it happens that the ten cubic centimeters of potassium permanganate solution is all consumed in the oxidation of organic, matters contained in the water. Another test is then made, in which, instead of ten cubic centimeters, fifteen or twenty or more, as the case may be, are employed, the procedure otherwise being- the same as above.

TOTAL SOLIDS AND THE LOSS ON IGNITION.—We have determined the total solids in waters by evaporating a suit able quantity (from † liter to 1 liter) of the sample to dryness in a platinum dish upon the water bath. After coming to dryness the dish and contents is placed in an air bath kept at 180 degrees centigrade and the vessels are so heated until the weight is essentially constant.

For the determination of "Loss on Ignition'' we have used the device employed by the Massachusetts State Board of Health, namely, a platinum dish which is somewhat larger than the one in which the total solids are contained, is brought to redness by a proper Bunsen flame, and the dish with the residue from the evaporation is brought inside. The properly moderated temperature here attained is sufficient to bring the organic substances in the dish to a state of incandescence so that they are quite readily consumed. Usually, however, where very much organic matter is contained small particles of carbon are left in the residue and the contents of the dish remain dark in color. The temperature attained in this operation is sufficient, of course, to completely remove water from sulphates and to decompose the nitrates of calcium and magnesium, so that even by this method the loss in weight resulting from the process cannot be looked upon as in any degree a definite or even an approximate measure of the quantity of organic matters contained, and the importance of the determination is largely limited to the general indications, *i. e.*, the inferences which may be drawn from a blackening of the residue, the development of marked odors, or the evolution of colored fumes.

SUSPENDED MATTERS.—In the case of certain turbid surface waters and some deep well waters we have made determinations of the nitrogen as free and as albuminoid ammonia, the total organic nitrogen, the oxygen consumed, the total solids and the loss on ignition, in the water after it has been filtered, in addition to the determinations made with the water in its original condition.

The water for this purpose is filtered clear through a German filter paper, the first portions being rejected in order to avoid the presence of anything dissolved from the paper; the portion succeeding is used for the determinations of total solids and loss on ignition, while the portions which pass through the filter last, and which consequently are less liable to contain any ammonia compounds dissolved from the paper, are used for the determination of the ammonias, the total organic nitrogen, and the oxygen consumed.

The ODOR, we have ordinarily noted in the original condition as the sample is brought to the laboratory. In some cases also by putting in a covered vessel, warming gently and bringing near to the nostrils just before the cover is removed.

The COLOR, we have in most cases determined directly, using again the method of the Massachusetts Board of Health, that is, the color has been compared to the tint developed in the Nessler standards. The results have value only for comparison of waters examined by us, as our standards are not identical with those used elsewhere.

The HARDNESS of waters, we have not generally determined, but whenever it seemed especially desirable it has been estimated by the use of soap solutions as per Clarke's method.

TURBIDITY AND SEDIMENT.—The water on reception in the laboratory has been examined for turbidity and sediment, and again after standing over night determination has been made by mere inspection, the terms "slight," "distinct," "decided," and "much," being used to indicate the degree of turbidity, and the terms "very little," "little," "considerable," and "much," being used to roughly indicate the relative quantities of sediment.

REPORTS OP THE CHEMICAL EXAMINATIONS.

Many citizens of the State have taken advantage of the opportunity offered by the University, to obtain chemical analyses of their respective water supplies, and in consequence we have made examinations of numerous samples of water derived from ordinary wells.

The results of all such analyses are reported immediately to the sender of the sample and when sufficient information concerning the source of the water is at hand, an interpretation of the results and an opinion regarding the wholesomeness of the water is furnished. together with whatever recommendations seem requisite. The blank form for the report is as follows:—

DEPARTMENT OF CHEMISTRY UNIVERSITY OP ILLINOIS.

URBANA, Ill,..189

Laboratory No..............................

Report of the Sanitary Chemical Analysis of Water Sent by

....

Source of Water...

....

(Amounts are Stated in Parts per Million.)

Total residue by evaporation..
Fixed residue (mineral matter)..
Volatile matter (loss or ignition)..

Chlorine in chlorides..
Oxygen consumed..
Nitrogen as free ammonia..
Nitrogen as albuminoid ammonia..................................... ....
Nitrogen as nitrites..
Nitrogen as nitrates..
....
....

In order that the connection between the character and the surroundings of the source of supply, the data resulting, from the chemical examination, and the opinion and recommendations based upon their consideration, may in some measure, be understood by the parties interested, the following brief statement explaining the basis of interpretation has been prepared to accompany the reports:

SIGNIFICANCE AND INTERPRETATION OF RESULTS.

The statement of results is made in parts by weight per million parts of water by weight. hence, *one part* as recorded in the report, is equivalent to one ten-thousandth of one per cent, or is equivalent to .058335 grain per United States gallon of 231 cubic inches.

In arriving at the conclusions set forth in the report the following is the basis of interpretation of the analytical data:

First, the substances referred to and upon which the report is made are not considered to be in themselves harmful in the quantities which are found in potable waters, but they are significant of the condition of the water for reasons which may be briefly stated as follows:

"TOTAL RESIDUE BY EVAPORATION," comprises the solid matters left upon evaporating the water and drying the residue at 180 degrees centigrade It includes both inorganic and organic substances. The inorganic constituents are salts, and comprise mainly compounds of lime, magnesia, soda, potash, iron, and alumina, with chlorine, carbonic, sulphuric, nitric, and silicic acids. Unless the quantity of mineral matter is excessively high, the determination is not particularly significant, and ordinarily for sanitary purposes the individual constituents are not separately determined.

"FIXED RESIDUE (mineral matter,)" is that portion of the total solids which is inorganic, and is neither burned away nor otherwise decomposed by application of heat.

"VOLATILE MATTER (loss on ignition)," comprises the loss in weight which the "total residue by evaporation" suffers on being heated to redness. It includes the organic matters, which burn away, and such constituents of the mineral matters as are volatile or are decomposed by heat into volatile products. This determination is of special significance only in so far as the manifestation of a change in color, the development of odors, or the evolution of fumes, or the absence of any such change, may indicate the nature of the constituents of the water.

"CHLORINE IN CHLORIDES" refers to the quantity of chlorine contained in the water in combination with the basic elements. It is a considerable constituent of common salt. Most animal matters contain more or less chlorides, and chlorides are constant and considerable constituents of sewage or drainage from refuse animal matters.

The presence of chlorine in water in amounts exceeding the normal quantity generally indicates that the water has been polluted by animal matters, but is not conclusive evidence thereof, and it must be remembered that the waters of many deep wells contain large quantities of chlorides derived from subterranean deposits of salt.

"OXYGEN CONSUMED" refers to the quantity of oxygen required to oxidize the organic matters present in the water. In general, a considerable quantity of oxygen required for this purpose represents a considerable quantity of organic matter in the water, and *vice versa,* a small quantity of oxygen consumed indicates comparative freedom from organic matters. However, many of the organic matters which may be contained in water are not readily affected by the oxidizing agent and in no case does the quantity of oxygen consumed bear a direct ratio to the total quantity of organic matter contained.

THE ORGANIC MATTERS.—No practicable means exist for the accurate determination of the quantity and the character of the various individual organic substances contained in water.

These substances include living organisms, both vegetable and animal; products of organic life as faecal matters, etc., and products of the decomposition of organic matter.

Nitrogen is an essential constituent of all living things; it is to the nitrogenous organic matters that the greatest sanitary importance attaches; and as accurate methods for the determination of nitrogen in the four forms in which it may exist in water are available, the study of the organic matters is usually limited to the investigation of the nature and the quantity of the nitrogenous substances.

"NITROGEN AS ALBUMINOID AMMONIA" represents the nitrogen contained in the various organic substances which

exist in the water in the undecomposed state. These include the products of organic life, as albuminous substances, tissues, urea, faecal matters, etc , etc., substances which serve as nutrients upon which germs thrive and multiply; and also living organisms themselves, both vegetable and animal, including bacteria. The presence of much nitrogen as albuminoid ammonia *usually* suggests pollution with sewage or drainage from refuse animal matters.

"NITROGEN as FREE AMMONIA," so-called, represents ammonia contained in the water in either the free or saline condition, and which usually proceeds from the natural decomposition of nitrogenous organic matters in the first stages of oxidization. Its quantity is ordinarily indicative of the amount of organic matter which is contained in the water, in a partially decomposed state. It is a characteristic and a considerable constituent of sewage.

Both free ammonia and albuminoid matters in water, in undergoing decomposition are oxidized, the final product being nitric acid, which unites with the basic mineral matters present and consequently appears as nitrates.

"NITROGEN AS NITRITES."—Nitrous acid, or nitrites, constitute the second intermediate stage in the oxidation of nitrogenous organic substances into inorganic products. The presence of any considerable quantity of nitrite in the water shows that decompositions due to the vital processes of living organisms are under way, and the quantity of nitrite indicates in some degree the character and the amount of organized life present in the water.

"NITROGEN AS NITRATES."—Nitrates are the final products of oxidation of the nitrogenous matters; their presence in considerable quantity indicates that at least correspondingly considerable quantities of organic matters have been previously contained.

The significance of all four of these forms of nitrogen is not complete evidence unless considered in conjunction with the other constituents, and in reference to the nature of the source of the water.

Vegetable organic matter is comparatively harmless. The presence of animal matters on the other hand usually subjects the water to grave suspicion, since the danger attending the presence of organic matters in water arises chiefly from the fact that accompanying matters of animal origin there will be, in case of disease, also disease germs themselves.

STANDARDS OF PURITY.

While it is fully realized that no hard and fast standards of purity whereby to judge the condition of potable waters can be justly established, yet for purposes of comparison, and for the information and convenience of those to whom our reports are sent, the following limits have been provisionally adopted as a reasonable basis for reaching conclusions regarding the wholesomeness of the waters of ordinary shallow wells:

MAXIMUM LIMITS OF IMPURITIES.

TOTAL SOLIDS	500. parts per million.
LOSS ON IGNITION	No blackening should occur and no offensive odor should be developed.
OXYGEN CONSUMED	2.0 parts per million.
CHLORINE	15.0 parts per million.
NITROGEN AS FREE OR SALINE AMMONIA	0.02 part per million.
NITROGEN AS ALBUMINOID AMMONIA	0.05 part per million.
NITROGEN AS NITRITES	0.01 part per million.
NITROGEN AS NITRATES	15.0 parts per million.

EXAMINATIONS OF WATERS.

During the fifteen months which have elapsed since the work was inaugurated, we have made the sanitary chemical analysis of 1,787 samples of water coming from various sources within the State.

A large proportion of the work has consisted of the examination of single samples of water from house wells or cisterns, used for domestic supply by citizens of various towns and villages. These analyses were asked for by the persons interested, mostly because of the prevalence of typhoid fever or diphtheria in their respective communities and the suspicion that the waters used were the causes of the disease. In most cases the analyses have shown that there was good

ground for this suspicion, by revealing evidence of the contamination of the water of the wells by sewage or drainage from refuse matters of animal origin, and the results of our investigation have in numerous instances led to the condemnation of the sources of supply as being in such condition as to endanger the health of the user.

Circumstances involving the financial provision for the work have limited our investigation of the general sources of water supply, but systematic periodic examinations of some of the surface waters and also of certain ground waters have been carried forward sufficiently to yield interesting information regarding some of these sources of supply, though the work is scarcely far enough advanced at present to warrant the drawing of any fixed conclusions.

Upon August 16, 1896, the chemistry building of the University was almost destroyed by fire, one of the consequences being the total loss of our complete records of the work done during the eleven months immediately preceding. However, some of our original note books were saved from the fire and the complete results of some of the analyses and parts of the results of others have been resurrected from these sources.

Further, at the time of the fire, reports of the analyses of 613 samples of water, mainly ground waters, had already been sent to the various persons for whom the examinations had been made, and although a great many of these reports appear to have been mislaid or otherwise lost by the recipients, yet we have recovered a part of them for transcription to our records.

EXHIBIT OF RESULTS.

The following tabulations include the analyses of which we have been able to reproduce the records. They are arranged in three general groups, as follows:

1. Analyses of water samples derived from various minor sources, mainly house wells, cisterns, or springs, used for family supply, sent to us for examination by citizens or officials of the communities named in the tables. The tabulations of these analyses are arranged in alphabetical order by

towns. The total number of such samples analyzed to December 31, 1896, is 802.

2. Records of the periodic examinations of the water of certain wells, of which the analyses have been made for the purpose of determining the normal characteristics of some of the ground waters of the State.

3. Examinations of certain surface waters, mainly the waters of the Illinois river and some of its tributaries.

Some of the analyses which appear in the tabulations are incomplete because of the fire losses referred to above, but nevertheless they have been included, since even the fragments admit of comparison with other analyses.

The necessity of reporting at this time concerning the work accomplished, determines the character of the report as being merely preliminary, inasmuch as none of the investigations are complete, and the press of other duties requires that it be hastily prepared.

The various samples of water, aggregating the total number of seventeen hundred and eighty-seven, which have deen analyzed during the fifteen months ending December 31, 1896, have come from one hundred and fifty-six towns, situated in sixty-eight different counties of the State, as follows:

COUNTIES PROM WHICH WATER SAMPLES HAVE BEEN RECEIVED FOR ANALYSIS.

Adams,	Payette,	Logan,	Rock Island,
Alexander,	Pulton,	McDonough,	Sangamon,
Bond,	Gallarin,	McHenry,	Shelby,
Brown,	Greene,	McLean,	St. Clair,
Bureau,	Grundy,	Macon,	Stark,
Calhoun,	Hancock,	Macoupin,	Stephenson,
Carroll,	Henry.	Madison,	Tazewell,
Cass.	Iroquois,	Marshall,	Vermilion,
Champaign,	Jackson,	Mason,	Wayne,
Christian,	Jo Daviess,	Massac,	White,
Clay,	Kane,	Menard,	Whiteside,
Coles,	Kankakee,	Mercer,	Will,
Cook,	Kendall,	Montgomery,	Winnebago,
Cumberland,	Knox,	Morgan,	Woodford.
DeKalb,	Lake.	Moultrie,	Total, G8.
DeWitt,	LaSalle,	Ogle.	
Douglas,	Lee,	Peoria,	
Dupage,	Livingston,	Piatt,	

TOWNS PROM WHICH WATER SAMPLES HAVE BEEN RECEIVED FOR ANALYSIS.

Abingdon,	DeKalb,	Lincoln,	Rock Falls,
Afton,	Des Plaines,	Litchfield,	Rockford,
Algonquin,	Dixon,	Lockport,	Rock Island,
Alton,	Dwight,	Long Creek,	Rogers Park,
Arenzville,	Easton,	Long Grove,	Rochelle,
Astoria,	Edwardsville,	Macomb,	Seaton,
Athens,	Elburn,	Manteno.	Sherrard,
Atlanta,	Elgin,	Mason City,	Shilo Center,
At wood,	Elm wood,	Mattoon,	Shirland,
Aurora,	Farina,	Metropolis,	Sidney,
Batavia,	Farmer City,	Milan,	Siloam,
Belleville,	Parmington,	Montgomery,	Springfield,
Bethany,	Ferris,	Morris,	Spring Valley,
Big Rock,	Findlay,	Morton Grove,	Sterling,
Bloomington,	Flora,	Mt. Carroll,	St. Joseph,
Blue Mound,	Forrest,	Mt. Morris,	St. Paul,
Buda,	Freedom,	Muncie,	Stonington,
Byron,	Freeport,	Newman,	Streator,
Cairo,	Galesburg,	Nokomis,	Sullivan,
Camargo,	Girard,	Oak Park,	Sycamore,
Cambridge,	Golden Eagle,	Odell,	Taylorville,
Canton,	Goldengate,	Ohio,	Thomasboro,
Carbondale,	Greenfield,	Onarga,	Toledo,
Carlinville,	Greenville,	Ottawa,	Tolono,
Carmi,	Greenwood,	Pana,	Topeka,
Carthage,	Harmon,	Paris,	Urbana,
Cazenovia,	Havana,	Pekin,	Utica,
Champaign,	Homer,	Peoria,	Vermont,
Chahdlerville,	Hopedale,	Peru,	Viola,
Charleston,	Hopkins Park,	Piano,	Walnut,
Chenoa,	Jacksonville,	Polo,	Warren,
Chicago,	Joliet,	Pontiac,	Warrenville,
Clay City,	Kampsville,	Potomac,	Waukegan,
Cortland,	Kankakee,	Quincy,	Wenona,
Cuba,	Kendall,	Ransom,	White Heath,
Dallas City,	Knoxville,	Ridgway,	Wilmington,
Danville,	Lake Forest,	Riverside,	Woodstock,
Dayton,	LaMoille,	Riverton,	Wyoming.
Decatur,	LaSalle,	Roanoke,	Total towns, 156
Deerfield,			

A fair idea of the general distribution of the localities of the sources whence came the waters which we have analyzed may be had by inspection of the map at the end of the book. The locations of water sources are indicated by the heavy black circles.

ANALYSES OF POTABLE WATERS MADE AT THE REQUEST OF PRIVATE CITIZENS OR FOR HEALTH OFFICERS.*

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance. Turbidity.	Sediment.	Color.	Odor.	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
1597	Abingdon	Nov. 4, 1896	....	slight	little	.03	none	498.8	48.	450.8	white	50.	1.2	.001	.046	.03	27.3
51	Afton	Oct. 9, '95	12	...*...	....	.....	....	508.3	14.4	492.9	....	15.	2.2	.284	.068	none	none
599	Algonquin	Mar. 20, '96	160	....	....	.....	....	291.6	5.6	286.	white	2.5	2.95	......	......	"	.18
60	Arenzville	Oct. 7, '95	artesian	....	....	.....	....	963.4	5.8	957.6	"	114.	2.7	.212	.132	"	.188
1364	Astoria	Sept. 9, '96	1650	much	consid	.04	oily	3593.6	36.	3557.6	gray	1170.	5.9	1.68	.018	"	.02
1240	Athens	Aug. 6,	....	much	"	.4	none	4237.6	40.	4197.6	brown	1960.	15.4	.96	.308	"	.04
964	Atlanta*	June 9,	151	consid	little	1.	"	482.	14.4	467.6	"	7 5	5.8	4.	.162	"	.048
965		"	151	"	"	1.	"	557.2	16.4	540.8	"	15.	6 6	3.7	.194	"	.052
1293		Aug. 17,	151	"	"	.8	"	492.8	16.	476.8	"	4.1	6.2	4.	.18	"	.08
1294		"	151	"	"	.8	"	607.6	16.	591.6	"	21.	6.4	3.84	.2	"	.1
1295		"	151	"	"	.8	"	562.4	20.	542.4	"	17.	6.4	4.	.24	"	.1
1296		"	151	"	"	.8	"	572.	18.	554.	"	16.	7.3	4.	.2	"	.1
581	Atwood†	Mar. 16,	79	....	....	.....	....	775.2	46.	729 2	"	116.5	4.5	1.3	.236	.1	6.
582		"	77	....	....	.....	....	916.8	32.	884.8	white	18.5	.1	.268	.044	none	.75
583		"	28	....	....	.....	....	552.8	28.8	524	"	23.	1.2	.001	.068	none	none
1250		Aug. 11,	25	slight	little	.02	none	845.6	58.	787.6	"	138.	2.	.032	.48	.001	6.
1252		"	28	consid	consid	.8	"	496.8	32.	464 8	brown	5.3	7.5	.496	.176	none	.14
1253		"	14	slight	little	.04	"	1138.4	130.	1008 4	"	141.	6.4	none	.186	"	28.
678	Aurora‡	April 6,	16	....	....	.....	....	513.6	15.6	498.	white	16.5	.9	"	.03	"	.65
679		"	20	....	....	.....	....	584.8	34.	550.8	"	27.	.9	"	.023	"	7.5
729		April 16,	190	....	....	.....	....	576.8	14.	562.8	"	6.	.9	......	......	"	.03
1062		June 3,	24	....	....	.....	....	852.	72.	780.	"	57.	.8	.003	.038	.005	23.
1156		July 19,	25	....	....	.....	....	346.4	35.6	310.8	"	15.	1.	.58	.086	.023	1.
83	Batavia	Oct. 15, '95	flowing well	....	....	.....	....	331.4	18.8	312.6	....	7.5	.2	.5	.01	none	.1
895	Belleville§	May 25, '96	23	....	....	.....	....	1786.	86.	1700.	brown	221.	3.2	.946	.244	.06	.3
1450		Oct. 6,	reserv'r	consid	little	.7	none	176.8	13 2	163.6	"	3 8	7.5	.036	.44	.032	.7
1456		Oct. 2,	"	slight	slight	.02	"	139.6	10.	129 6	"	3.2	4.8	.024	.288	none	.15
1457		Oct. 3,	lake	"	"	.02	"	148.	12.8	125.2	"	3.3	5.6	.03	.284	.009	.15
756	Bethany	April 21,	deep	....	....	.....	....	933.6	70.4	863 2	gray	122.	3.8	none	.013	.225	39.77
757		"	shallow	....	....	.....	....	775.6	83.2	692.4	"	133.	8.9	.176	.294	5.5	17.
623	Big Rock	Mar. 24,	3[illegible]	....	....	.....	....	477.2	77.6	399.6	white	1.	1.85	.75	.126	none	1.4
91	Bloomington‖	Oct. 23, '95	34	....	....	.....	....	940.4	28.8	911.6	....	9.5	1.05	.188	.07	.002	.02
955		June 8, '96	....	slight	little	.02	none	1818.	128.	1690.	brown	156.	2.7	.012	.114	.014	6.25
956		"	....	none	none	.01	"	1100.8	150.	950.8	white	81.	1.7	none	.042	.001	20.
957		June 7,	12	"	little	.01	"	616.	82.	534.	"	35.	.9	.003	.016	.018	19.
958		June 8,	....	consid	consid	.04	none	1123.6	42	1081.6	brown	12.	6.5	.514	.038	none	.35

(Parts per 1,000,000.)

Number.	City or Town.	Date of Collection.	Depth of Well.	Turbidity.	Sediment.	Color.	Odor.	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
1047	Bloomington, cont'd‖	June 29, '96	34	....	....	.....	....	493.8	46.4	447.4	white	46.	.8	none	.02	.001	72.
1106		July 14,	33	....	....	.....	....	990 8	106.	881.8	"	70.	1.4	.038	.068	.01	.3
1028	Blue Mound	June 23,	45	....	....	.....	....	492.	24.	468.	gray	60.	2.	.824	.036	none	.1
1128		July 17,	28	....	....	.....	....	1070.	100.	970.	white	59.	3.	.046	.11	.07	60.
1297		Aug. 17,	26	consid	little	09	none	596.8	28.	568.8	brown	39.	25.3	2.8	.522	none	.3
1298		"	31	none	"	none	"	472.8	40.	432.8	white	18.	1.9	.001	.012	"	15.
1605		Nov. 9,	20	consid	"	mlky	"	489.2	44.	445 2	brown	90.	2.2	.008	.066	.017	27.
380	Byron	Jan. 4,	26	....	....	.....	....	339.6	31.2	308 4	white	11.	.5	.002	.046	none	6.5
1716	Buda	Dec. 10,	1616	slight	little	.15	none	1211.2	26.	1185 2	"	415.	3.8	1.52	.022	none	.05
765	Cairo¶	April 18,	522f	....	....	.....	....	364 8	17.2	347.6	brown	63.	3.4	......	......	.009	.204
856		May 18,	535f	....	....	.....	....	352.8	18.	334 8	"	90.	2.3	......	......	.001	.1
1607		Nov. 8,	705f	slight	little	.04	none	356.	10.	346.	"	110.	1.4	.36	.016	none	.06
1608		"	705f	"	"	.04	"	352.8	14.	338.8	"	110.	1.2	.36	.02	"	.06
1692	Carlinville	Dec. 4,	20	"	"	.03	"	760.	36.	724.	white	91.	1.6	.006	.018	.023	40.
937	Camargo	June 4,	35	"	"	03	"	518.8	11.2	507.6	"	24.	2.2	.01	.016	.003	33.
969	Cambridge**	June 11,	48	"	"	.02	"	1092	82.	1010.	"	83.	3.2	.03	.062	.019	20.
970		"	30	none	"	.01	"	544.	58.	486.	"	36.	2.2	.014	.052	none	6.
971		"	52	slight	"	.02	"	476.	64.	412.	"	1.6	1.6	.174	.04	"	.216
972		"	56	"	"	.01	"	792.8	56.	736.8	"	57.	1.7	.014	.036	.005	28.
973		"	54	"	"	.02	"	558.	60.	498.	"	33.	1.6	none	.016	none	5.5
974		"	70	consid	"	.8	"	504.	22.	482.	"	13.	5.	1.5	.134	"	.268

*The analyses of water from Atlanta were made at the request of the city authorities. The city supply is drawn from two adjacent wells each 151 feet in depth. Sample No. 964 was taken from one of these wells; sample No. 965 came from a hydrant a quarter of a mile distant from the well. The considerable difference in the total solids and in the chlorine led to the suspicion that surface waters were mixed with the well waters, consequently analyses of four other samples were made. Sample No. 1293 came from the old well; sample No. 1294 came from the new well; sample No. 1295 came from a hydrant one-quarter of a mile distant, and sample No. 1296 from another hydrant one-third of a mile distant from the well. The results of analyses Nos. 1293 and 1294 show conclusively that the two wells, although they are of the same depth and are but thirty feet apart, must receive water from different sources, and that the new well possibly receives surface water. The water in the mains (manifestly a mixture of the waters from the two wells) gives results which are of course between the two extremes.

†The samples of water from Atwood were drawn from various wells used for household supply, and ranging in depth from 14 to 77 feet. The results are perhaps characteristic of the ordinary wells of the State.

‡With one exception the waters from Aurora were from ordinary shallow wells, No. 729 being the only instance of a deep well water.

§The city of Belleville draws its supply from several reservoirs of surface water. The four samples from these reservoirs were sent to us by the superintendent of the water works.

‖Several of the samples of water from Bloomington coming from shallow wells were sent to us by the health officer because they were under suspicion of having caused sickness in the users. No. 958 came from the general city supply; the results of this analysis when compared with the results of an analysis made several years ago showed a decided change for the worse, since the mineral matters were greatly increased and the chlorine about doubled, these facts indicating that the surface areas which feed the well are becoming charged with the wastes of habitation.

¶The four samples analyzed were drawn from an artesian well, the first two before the final depth was reached; the other two were drawn from a depth of 705 feet. The water improved in quality as a greater depth was reached.

**The waters from Cambridge, sent by citizens, were collected from ordinary shallow wells; the results of the analyses show that in most cases the waters come from surface strata and are subject to the reception of surface drainage.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

ANALYSES OF POTABLE WATERS MADE AT THE REQUEST OF PRIVATE CITIZENS OR FOR HEALTH OFFICERS.*

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance. Turbidity.	Sediment.	Color.	Odor.	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
157	Canton††	Nov. 5, '95		*				1013.	47.6	965.4	white	52.	.8	.3	.08	none	4.2
1107		July 13, '96	1646					1776.	22.	1754.	red	270.	2.4	1.314	.044	"	.12
1108		" 13,	13					1148.	122.	1026.	white	76.	.9	.022	.058	.04	34.
1165		" 22,	24					1677.2	15.2	1662.	"	245.	1.8	.004	.05	.002	4.
1166		" 22,	32					986.	27.2	958.8	"	36.	2.3	.054	.062	.016	6.
681	Carbondale	April 6,	36					1012.8	37.6	975.2	gray	248	2.3	.028	.144	.009	34.
723		April 16.	35					949.6	18.	931.6		237.	1.	none	.027	.014	13 5
1571		Oct. 27,	330a	slight	little	.04	none	1932.	19.2	1912.8	white	881.2	4 3	.506	.05	.19	2.
646	Cazenovia	Mar. 28,	27					386.8	56.4	330.4	white	1.1	1.7	.642	.076	.004	.8
647		" 28,	cistern					102.	4.4	97.6	brown	.4	4.6	.006	.126	none	.88
20	Champaign*	Sept. 25, '95						397.2	31.2	366.	white	13.	.25	.362	.272	"	.038
359		Jan. 8, '96	27					1422.8	84.	1338.8	"	99.	2.9			003	62.
392		" 14,	185d					376.	5.6	370.4	brown	1.7	3.8	2.2	.14	none	.05
420		" 25,						569.6	74 8	494.8	white	35.	.9			.001	21.
423		" 27,	cistern					106.	14.8	91.2	black	1 75	11 5	.044	.116	.013	.5
424		" 27,						854.	36	818.	white	181.	1.7	.006	.06	.005	20.
435		" 29,	33					2022.	72.	1950.	brown	364.	2.3			.001	80
448		Feb. 3,	30					672.	78.	594.	white	126.	.8	.032	.075	.005	18.
450		" 3,						2449 2	150.	2299.2	"	252.	1.8			.015	90.
463		" 6,	33					580 8	8.6	572.2	"	88.	1 2			.001	34.
464		" 7,	27					370.	32 8	337.2	"	43.	4			none	16.
476		" 11,	21					1010.	98.	912.	"	116.	.55			.002	50.
482		" 12,						262.	4.	258.	"	3.6	2 85			.07	.302
493		" 15,	40					428.	24.	404.	"	24.	.45			.009	.374
503		" 20,	20					1580.8	102.	1478.8	"	199.	.8	.001	.069	.001	.3
508		" 22,	24					589.2	43.2	546.	"	40.	.75	.03	.025	none	20.
527		" 28,						458.8	17.6	441.2	"	25.	.4			"	.296
529		" 29,	35					304.	5.2	298.8	brown	4.3	.5			"	.15
546		Mar. 7,	35					308 8	21 2	287 6	"	4.5	.6			"	.036
636		" 28,	34					472.	38.	434.	white	15.	1.2			.003	3.4
665		Apr. 2,	25					262.4	30 8	231.6	"	10.	3			.001	8 6
692		" 9,	29					1384.8	68.	1316.8	gray	162.	4.4	.202	.152	2 2	46 2
752		" 21,	distilled					2.4	.8	1.6	red	.2	.7	1.29	.01	none	.036
766		" 28,	21					562.4	37.6	524.8	white	53.	.9			.016	11.
798		May 5,	36					340.	32.	308.	"	12.5	6			none	5.5
799		" 5,	160					388.	21.2	366.8	brown	2.3	3.6			"	.032

(Parts per 1,000,000.)

Number.	City or Town.	Date of Collection.	Depth of Well.	Turbidity.	Sediment.	Color.	Odor.	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
817	Champaign, cont'd*	May 8, '96	60					758.	62.	696.	white	105.	1.			.003	22.
827		" 12,	25					369.2	19.2	350.	"	21.	.7			.001	.5
874		" 22,	35					848.	90.	758.	"	38.	.8			.075	7.5
875		" 22,	102					665.6	57 6	608.	"	29.	.8			none	19.
891		" 26,	63					930.8	80.	850.8	"	56.	.7	.007	.062	.011	32.5
892		" 26,	180d					386.	16.	370	brown	2.	3 5	1.2	.066	none	.09
907		" 28.						286.	20.	266.	white	11.	.8	.016	.04	.014	6 5
1003		June 19,	25					1642.	160.	1482.	white	143.	1.9	.004	.12	.008	110.
1074		July 6,						1400.	124.	1276.	"	875.	10.8	.044	.174	.05	38.
1075		" 7,	cistern					94.	10 4	83.6	black	.8	12.15	1.04	.276	.008	.148
1076		" 7,	60					940.4	80.4	860.	white	80.	1.4	none	.054	.09	13.6
1085		" 9,						350.	30.	320.	brown	35.	3.5	.032	.12	.04	9.
1127		" 18,						790.	84.	706.	white	74.	1.7	.028	.102	.003	12.5
1216		Aug. 4,	14	slight	little	.03	none	529.6	32.	497.6	"	37.	2.1	.003	.04	.001	14.5
1227		" 6,	14	"	"	.02	"	685 2	27.2	658.	"	41.	1.9	none	.076	.045	21.
1228		" 6,	29	"	"	.03	"	1122.	59.2	1062 8	"	93.	3.1	.084	.144	.25	21.75
1248		" 11,	27	"	"	.01	"	826.	60.	766.	"	67.	1.2	none	.018	.001	28.
1321		" 28,	24	none	none	.01	"	229.	6.	223.	"	4.7	.8	.036	.018	none	1.5
1359		Sept. 9,	30	"	little	.02	"	736.	76.	660.	"	50.	1.1	none	.024	.001	25.
1366		" 11,	29	slight	"	.02	"	366.8	22.	344.8	gray	11.	1.1	.05	.28	none	.3
1374		" 15,	25	none	none	.02	"	355.6	38.	317.6	white	11.	.6	.01	.028	.001	8.
1381		" 16.	30	"	little	.01	"	449.6	44.	405.6	"	64.	1.1	.008	.052	.01	16.
1382		" 16,	shallow	slight	"	.02	"	477.2	62.	415.2	"	57.	1.	none	.026	.011	13.5
1397		" 23,	18	"	"	.02	"	484.8	18.	466.8	"	60.	1.4	.02	.042	none	16.5
1410		" 26,	35	none	none		"	768 8	49.6	719.2	"	55.	2.2	.001	.072	.001	10 5
1494		Oct. 13,	15	"	little	.01	"	445.2	25.2	420.	"	25.	1.3	.067	.301	.009	28.
1700		Dec 7,	36	slight	"	.02	"	8.6.	86.4	759.6	gray	68.	1.2	.018	.056	.004	33.
1189	Chandlerville	July 28,	120					718.8	22.	696.8	white	175.	3.5	1.6	.07	none	.1
620	Charleston	Mar. 24,	54					622.8	15.2	607.6	brown	34.	2.5			.03	.95
1038		June 25.	shallow					374.	25.	349.	white	39.	1.4	.416	.026	none	.06
908	Chenoa	May 27,	190-145	slight	little	.3	none	676.4	16.4	660.	brown	71.	18.8	2 7	66	"	.16
247	Clay City	Dec. 9, '95						3025.4	99.2	2926.2	red	31.5	2.2	.398	.04	"	.5
614	Cortland	Mar. 23, '96	80t					334.8	13.2	321.6	brown	1.3	3.4	1.7	.102	"	.08
1598	Cuba	Nov. 3,	38	consid	consid	.1	none	430.8	40	390.8	"	3.3	1.4	.004	.07	.001	.4
1358	Dallas City	Sept. 7,	125	slight	little	.03	"	798.8	4.	794.8	white	84.	1.6	.56	.078	none	.2
547	Danville.	Mar. 6,	23					728.	72.	656.	"	23.5	.6			"	14.37
1059		July 2,	14					778.	85.6	692.4	brown	67.	1.1	.003	032	.009	40.
1086		" 8,	28					676.8	34.	642.8	white	12	1.5	.008	.048	.005	1.2
844	Decatur†, continued page 32	Mar. 14,	city hydrant (river water)					286.	20.	266.		4.6	3 2			.006	1.7

††The waters from Canton include four samples from ordinary shallow wells and one, No. 1107, from a very deep well. The data show here again that the water from the ordinary shallow wells is quite impure.

*The somewhat large number of examinations made for the citizens of Champaign include numerous analyses of shallow well waters and the results reveal the fact that the shallow wells, here as elsewhere, should be generally condemned as sources of domestic supply.

†Several well waters were examined and in addition also several samples from the city supply drawn from the Sangamon river.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance. Turbidity.	Sediment.	Color.	Odor.	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia	Albuminoid Ammonia.	Nitrites.	Nitrates.
845	Decatur, cont'd†	May 13, '96	Sangamon river	......	......	......	......	328.	20.	308.	brown	4.7	6.	.106	.04	.09	1.7
1380		Sept. 14,	spring	slight	little	.01	none	484 8	26.	458 8	white	21.	.5	.01	.04	none	2.
1544		Oct. 2·,	16	"	"	.04	musty	607.2	56.	551.2	"	59.	3.5	.016	.084	.009	13.6
1738		Dec. 16,	26	"	"	.03	none	1298.	172.8	1125 2	"	201.	2.9	.002	.092	.001	40.
158	Deerfield	Nov. 4, '95	deep	......	......	......	......	547.4	7.8	539.6	black	15.1	2.45	.8	.172	none	none
305		Dec. 20,	*	......	......	......	......	783.6	18.4	765 2	brown	*	......	......	......	"	3.6
1226		Aug. 6, '96	......	slight	consid	.02	vinegr	312.8	40.8	272.	black	33.	15.8	.016	.828	"	.3
45	Des Plaines	Oct. 4, '95	......	......	......	......	......	1012.	26.	986.	......	190.	13.1	.06	.62	1.75	2.98
90		Oct. 18	22	......	......	......	......	360.2	22.4	337.8	......	47.	1.2	.05	.038	.001	.12
910	Dwight	May 27, '96	127	consid	little	y l'w	none	1034.8	96.	938.8	brown	34.	4.6	2.3	.176	none	.1
911		" 27,	127 filt	none	none	03	"	988	68.	920.	"	33.	3.8	2.2	.206	.2	.26
813	Easton	" 7,	83	....*...	......	......	......	295.6	20.	275.6	gray	3.2	.5	.11	.011	none	.1
814		" 7,	55*d*	......	......	......	......	426.	14.8	411.2	white	10.5	.8	.08	.028	"	.1
1264	Edwardsville*	Aug. 10,	74	consid	consid.	.03	none	662.8	30.	632.8	brown	17.	8 8	1.36	.28	"	.16
1454		Oct. 6,	35	none	none	none	"	139.2	5.6	133.6	"	1 6	8	none	.004	.009	4.
1455		" 6,	35	"	"	"	"	140.8	8	132.8	"	1.7	.6	"	.006	.008	4.
1283	Elburn	Aug. 13,	170	consid	consid.	1.	"	416.8	20.	396.8	"	4.8	4.4	2.48	.108	.001	.16
1284		" 13,	14	slight	little	.01	"	472.8	11.2	461.6	white	13.	1.6	.002	.018	none	8.5
1231	Elgin	Aug. 7,	city sup	"	"	.15	"	247.6	58.	189.6	brown	2.3	6.6	.03	.32	"	.25
629	Farina	Mar. 24,	35	......	......	......	......	1914.8	66.	1848.8	white	17.	.8	.02	.046	"	6.8
626		" 24,	40	......	......	......	......	2186.4	110.	2076.4	"	33.	1 4	none	022	"	19.
790	Farmer City	May 3,	25	......	......	......	......	534.	43.2	490.8	"	24.	.85	......	......	.001	15.
883		" 24,	120*a*	......	......	......	......	730.	22.	708.	brown	118.	7.6	......	......	none	.25
1041		Jun. 28,	170	......	......	......	......	719 2	14.	705 2	"	119.	11 8	3.8	.158	"	.116
1599		Nov. 6,	46	consid	little	.03	none	746.	96.8	649.2	white	63.	1.5	.002	.058	"	7.2
1584	Farmington	Nov. 2,	1465*a*	"	consid	m'dy	"	1640.	11.2	1628.8	brown	230.	3.5	1.28	.032	"	.1
371	Ferris	Jan. 9,	31	......	......	......	......	740.	64.	676.	white	189.	2.4	......	......	"	17.
372		" 9,	27	......	......	......	......	828.	64.	754.	"	89.	1.	......	......	.003	20.
1492	Findlay	Oct. 10,	spring	none	little	.01	none	424.8	29.2	395 6	"	22.	.8	.002	.036	.008	23 63
1493		" 10,	82	consid	consid	y'l'w	"	578.	28.	550.	brown	10.	5.7	4.56	.34	none	.09
649	Forrest	Mar. 30,	40	......	......	......	......	3301.2	226	3075.2	gray	430.	1.6	.002	.138	.019	90.
909	Freedom	May 28,	drilled	consid	consid	8	none	462.	30.4	431.6	brown	1.2	11.8	2.9	.501	none	.18
17	Freeport†	Sep. 18, '95	city	none	none	none	"	204.	70.	134.	gray	10.5	.6	.066	.04	.001	2.9
27		" 27,	"	"	"	"	"	382 6	61.6	321.	white	9.	.9	none	022	none	1.7
198		Nov. 14,	60	......	......	......	......	558.8	62.	496.8	red	35.	.4	.008	.064	.007	6.48
373		Jan. 9, '96	201	......	......	......	......	328.4	28.	300.4	white	3.1	1 9	......	......	none	1.238

(Parts per 1,000,000.)

Number.	City or Town.	Date of Collection.	Depth of Well.	Turbidity.	Sediment.	Color.	Odor.	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia	Albuminoid Ammonia.	Nitrites.	Nitrates.
512	Freeport con't'd†	Feb. 21, '96	87	......	......	......	......	344.8	10.8	334.	brown	1.05	1.	.78	.18	none	.155
553		Mar. 7,	227	......	......	......	......	410.8	58.4	352.4	white	1.3	.5	......	......	"	04
846		" 13,	100	......	......	......	......	395.6	22.	373 6	brown	.8	2.35	......	......	"	.104
1061		July 1,	33	......	......	......	......	426.	48.	378.	white	12.	1.8	.346	.074	.02	.95
1511		Oct. 14,	tap	none	none	.03	none	380.8	26.	354.8	"	12.	1.4	.014	.02	.009	2.7
1545		" 24,	"	"	"	.02	"	368.	36.	332.	"	12 5	1.	.024	.022	.006	28.
1555		" 25,	225	consid	little	.04	"	2128.8	144.	1984.8	gray	12.	2.5	2.72	.068	none	.04
568	Galesburg‡	Mar. 10,	......	......	......	......	......	620 4	110.	510.4	"	83	1.15	......	......	.002	34.
569		" 10,	......	......	......	......	......	524.8	54.	470.8	"	56.	1.7	......	......	.001	19.
570		" 10,	......	......	......	......	......	598.	52.	546.	white	52	.9	......	......	none	13.
571		Mar. 10,	......	......	......	......	......	1054.	87.2	966.8	gray	120.	6.3	......	......	.35	27.
591		" 17,	30	......	......	......	......	1040.	94.	946.	white	132.	1.5	......	......	.003	50.
592		" 17,	25	......	......	......	......	596.	58.	538.	"	46.	1.2	......	......	.001	17.
593		" 17,	22	......	......	......	......	506.	22.8	483.2	"	36.	1.45	......	......	none	21.
594		" 17.	26	......	......	......	......	774.8	58.	716.8	"	137.	1.	......	......	"	22.
595		" 17,	28	......	......	......	......	1046.	72.	974.	"	119.	5.6	......	......	.007	64.
596		" 17,	24	......	......	......	......	510.4	42.	468.4	"	34.	1.1	......	......	none	18.
608		" 23,	23	......	......	......	......	727.6	62.	665.6	"	71.	.75	......	......	.001	31.
609		" 23,	23	......	......	......	......	398.	53.6	344.4	"	26.	.3	......	......	none	9.
610		" 23,	18	......	......	......	......	835.2	90.4	744.8	"	77.5	.45	......	......	.006	36.
611		" 23,	city wat	......	......	......	......	485.6	16.8	468.8	brown	14.5	2.7	......	......	none	.2
612		" 23,	23	......	......	......	......	492.	21.2	470.8	"	12.	2.7	......	......	.001	.4
613		" 23,	26	......	......	......	......	712.	50.	662.	white	87.	1.3	......	......	.003	36.
659		Apr. 1,	22	......	......	......	......	776.	40.	736.	"	61.	.7	......	......	none	22.5
660		" 1,	25	......	......	......	......	962.8	20.8	942.	"	113.	.9	......	......	"	67.5
661		" 1,	25	......	......	......	......	1025.2	27.2	998.	"	119.	.7	......	......	"	45.
662		" 1,	24	......	......	......	......	1055.6	94.8	960.8	"	200.	1.	......	......	.005	55.
663		" 1,	24	......	......	......	......	915.6	32.	883.6	"	77.	.75	......	......	.005	50.
664		" 1,	......	......	......	......	......	652.4	48.	604.4	"	40.	.8	......	......	none	17.5
710		" 13,	20	......	......	......	......	456.4	52.8	403.6	"	35.	.6	......	......	"	15.
711		" 13,	25	......	......	......	......	364.	34.	330.	"	16.	.5	......	......	"	9.
712		" 13,	20	......	......	......	......	581.6	50.	531.6	gray	45.	.7	......	......	"	27.
713		" 13,	19	......	......	......	......	908.8	88.	820.8	white	70.	.9	......	......	"	22.
714		" 13,	25	......	......	......	......	1672.8	148.	1524.8	gray	204.	1.3	......	......	.024	64.
715		" 13,	24	......	......	......	......	630.4	38.	592.4	"	61.	.8	......	......	.002	30.

*One sample from an ordinary shallow well, and two samples from a new well proposed as a source of general city supply. The latter yields water of exceptional purity and was recommended as a source of most wholesome supply.

†Samples came from the health officer and also some from the superintendent of the water works. Nos. 17, 27, 1511, and 1545 are from the city supply, which is drawn from artesian wells, ranging from 35 to 50 feet in depth.

‡The several analyses were made at the request of the health commissioner of the city. The samples were mostly from shallow house wells and it is evident that these are nearly all so situated as to receive drainage from refuse animal matters. Several samples came from the city supply, and from the analyses of these the fact is revealed that the deep drift wells from which the supply supposedly is derived yields much better water than is contained in the reservoir or is drawn from the hydrants.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

ANALYSES OF POTABLE WATERS MADE AT THE REQUEST OF PRIVATE CITIZENS OR FOR HEALTH OFFICERS.*

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance.			Odor.	Residue on Evaporation.			Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as			
				Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.				Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
786	Galesburg, cont'd. (See footnote on preceding page.)	Apr. 29, '96	26	......	......	......	......	674.	52.	622.	white	39.	.9	......	......	none	27.
787		" 29,	58	......	......	......	......	800.	112.	688.	"	127.	1.	......	......	.001	23.
788		" 29,	20	......	......	......	......	839.6	90.	749.6	"	90.	1.3	......	......	.001	3.5
789		" 29,	19	......	......	......	......	476.8	42.	434.8	"	20.	.95	......	......	none	50.
830		May 11,	18	......	......	......	......	958.	80.	878.	"	113.	.8	......	......	.03	30.
831		" 11,	19	......	......	......	......	816.	60.	756.	"	78.	1.8	......	......	.006	27.
832		" 11,	24	......	......	......	......	574.4	42.4	532.	"	46.5	.5	......	......	none	12.
833		" 11,	20	......	......	......	......	1066.	94.	972.	"	75.	1.25	......	......	.007	32.
1019		Jun. 22,	......	......	......	......	......	329.2	33.2	296.	gray	15.	2.1	.008	.038	none	1.8
1020		" 22,	19	......	......	......	......	426.	34.	392.	white	16.	1.4	.006	.042	"	11.
1021		" 22,	18	......	......	......	......	944.	44.	900.	"	66.	1.3	.006	.034	.004	5.
1022		" 22,	23	......	......	......	......	548.8	48.	500.8	"	37.	.9	.002	.044	none	6.8
1023		" 22,	28	......	......	......	......	1164.	134.	1030.	"	99.	2.4	.008	.092	.001	64.
1024		" 22,	25	......	......	......	......	698.8	52.	646.8	"	53.	2.3	.018	.048	.004	6.5
1580		Nov. 2,	hydrant	......	......	......	......	802.	20.	782.	brown	40.	5.1	.04	.296	.02	.128
1581		" 2,	res'voir	......	......	......	......	789.6	14.	775.6	"	55.	4.5	.08	.32	.005	.08
1582		" 2,	cit. wells	......	......	......	......	568.	16.	552.	"	19.	1.9	.72	.072	none	.064
1583		" 2,	hydrant	......	......	......	......	769.2	19.2	750.	"	45.	2.6	.32	.168	"	.096
590	Girard	Mar. 17, '96	25	......	......	......	......	322.	16.	306.	white	9.	1.1	*...	......	none	.2
826	Golden Gate	May 8,	45	......	......	......	......	4105.6	206.	3899.6	"	64.	3.7	......	......	.1	3.
560	Greenfield	Mar. 9,	......	......	......	......	......	828 8	16.	812.8,	gray	12.	1 3	.116	.046	none	1.
625	Greenville	" 23,	30	......	......	......	......	552.4	20,8	531.6	white	21.	1 1	none	.03	"	5 5
1014	Greenwood	June 20,	......	......	......	......	......	368.	28.	340.	"	11.	2.8	.004	.024	"	.9
1119	Harmon*	July 15,	21*d*	......	......	......	......	242.4	12.4	230.	"	3.4	1.2	.13	.038	.001	.1
1120		" 15,	41*d*	......	......	......	......	242.	19.2	222.8	gray	9.	1.4	.162	.034	none	.1
1121		" 14,	35*d*	......	......	......	......	202.	4.	198.	"	1.7	1 9	.144	.044	"	.2
1122		" 15,	30*d*	......	......	......	......	186.	8.8	177.2	"	4.	1.1	.118	.036	"	.1
1123		" 15,	30*d*	......	......	......	......	354.	92.	262.	red	19.	1.3	.84	.056	"	.1
237	Homer	Dec. 2, '95	75	......	......	......	......	1979.	3 2	1975.8	white	730.	2.45	.71	.016	"	.05
1142		July 21, '96	40	......	......	......	......	406.	24.	382.	gray	3.	3.1	.41	.062	.06	1.
1677	Hopedale	Nov. 29,	16	slight	little	.03	none	340.	44.	296.	white	26.	1.9	.002	.046	.002	8.8
572	Hopkins Park	Mar. 10,	28*d*	......	......	......	......	62.8	6.	56 8	"	.8	.15	.02	.026	none	.3
1048	Jacksonville†	June 28,	2900	......	......	......	......	2466.4	20.4	2446.	brown	1000.	4.5	1.5	.042	"	.06
1049		" 28,	3028	......	......	......	......	2489.2	21.2	2468.	"	1015.	5	1.3	.038	"	.044
1406		Sept. 23,	24	none	little	none	none	730.4	77.6	652.8	white	77.	1.3	.003	.04	"	18.
1407		" 24,	18	slight	"	.02	musty	466.8	39.6	427.2	"	38.	2 8	.006	.134	.037	10.

(Parts per 1,000,000.)

Number.	City or Town.	Date of Collection.	Depth of Well.	Turbidity.	Sediment.	Color.	Odor.	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
1408	Jacksonville, cont'd†	Sept. 23, '96	24	none	little	none	none	892.	74.	818.	white	211.	1.9	none	.038	.036	25.
1409		" 24,	22	slight	"	.02	"	603.6	52.8	550 8	"	41.	1.9	.003	.062	.001	26
1458		Oct. 7,	26	"	"	.03	"	206.	36.	170.	"	18.	1.3	none	.024	none	1.
1459		" 7,	25	"	"	.04	"	493.2	28.	465.2	"	56.	1.7	.001	.047	"	11.
1460		" 7,	33	d'cid'd	"	.1	"	117.6	10.	107.6	"	3.4	1.3	.003	.04	"	1.8
1461		" 7,	30	none	none	.01	"	529.6	36.8	482.8	"	46.	.7	none	.008	"	14.5
1462		" 7,	30	d'cid'd	little	.04	"	418.8	32.	386.8	"	44.	1.4	.004	.062	.009	11.
1463		" 6,	27	slight	"	.02	"	716.	22.	694.	"	42.	.7	.001	.008	none	27.
1464		" 6,	23	none	"	.02	"	713 6	68.	645.6	"	43.	1.9	.002	.052	.001	32 5
1465		" 8,	30	slight	"	.02	"	276.	32.	244.	"	60.	.9	.001	.06	.001	3.
1466		" 8,	25	"	"	none	"	432.	48.	384.	"	44	.9	none	.022	none	2.5
1467		" 8,	24	none	"	"	"	817.6	48.	769 6	"	76.	.9	"	.046	.017	40.
1468		" 8,	19	"	"	.01	"	1470.8	100.	1370.8	"	600.	3.	.001	.034	.001	6.
1469		" 8,	20	"	none	none	"	1248.	128.	1120.	"	250	1.7	none	.074	.001	55.
1470		" 8,	23	d'cid'd	little	.02	"	862.4	73.2	789.2	"	82.	1.1	.002	.068	.007	29.
1471		" 8,	24	none	none	none	"	956.	100.	856.	"	112.	.9	.108	.028	.125	15.
1472		" 8,	cistern	slight	little	.02	"	98.8	9.6	89.2	"	10	1.8	002	.094	.08	.5
1473		" 8,	19	none	none	none	musty	363.2	28.	335.2	"	39	1.7	.008	.038	.034	5.5
1482		" 9,	25	"	"	"	none	605	52.	553.	"	66.	1.	none	.018	.007	18
1483		" 9,	24	"	"	.01	"	316 4	22.	294.4	"	1.6	.9	.003	.013	none	1.8
1505		" 13,	29	slight	little	.02	none	508.	62	446.	"	20.	1.4	.004	.052	.03	10.
1509		" 14,	22	"	"	.03	"	416.	45.6	370 4	brown	72.	1.2	none	.016	none	8.5
1512		" 16,	25	"	"	.03	"	766.8	34.	732.8	white	52.	1.2	"	.04	.02	40.
1513		" 17,	cistern	"	"	.08	"	57.6	6.	51.6	brown	12.	2.3	"	.052	none	.85
1514		" 16,	city w'tr	d'cid'd	consid	m'dy	"	879.2	14.4	864.8	"	280.	5.	.024	.256	.001	1.15
1515		" 16,	artesian	"	little	y'l'w	"	2476.	18.	2458.	"	990.	4.1	1.32	.014	none	.2
1524		" 19,	24	slight	"	.03	"	531.2	44.4	486.8	white	105.	1.2	none	.01	"	3.
1525		" 19,	20	"	"	.03	"	776.8	80.	696 8	"	202.	1.6	.014	.024	.027	17
1526		" 19,	22	"	"	.02	"	197.6	18.	179.6	"	3.6	1.2	.014	.032	.004	5.3
1527		" 19,	22	none	none	.03	"	760.	100.	660.	"	62.	1.35	.004	.046	none	27.5
1528		" 19,	24	"	little	.02	"	780.	52.	728.	"	83.	1.5	.002	.04	"	36.
1529		" 19,	28	slight	"	.03	"	817.2	83.2	734.	"	117.	1.7	.006	.04	.23	23.5
1530		" 19,	22	"	"	.02	"	339.6	39.6	300	"	34.	1.65	.001	.036	none	6.
1531		" 19,	24	"	"	.02	musty	437.2	62.	375 2	"	80.	1.4	.34	.078	.05	11.
1540		" 19,	24	none	"	.02	none	684.4	47 2	637.2	"	69.	1.1	.0 6	.088	.002	20.
1541		" 19,	50	slight	"	.02	"	644.	68.	576.	"	122.	1.7	.001	.048	.02	17.

*The samples of water from Harmon all came from driven wells, and the results show that even with driven wells of moderate depth there may be very wide deviations in the character of the constituents as is indicated especially by the total solids and the chlorine.

†Jacksonville possesses water works which furnish water drawn in part from artesian wells and in part from an adjacent brook. A large proportion of the people of the town depend for their water supply on ordinary wells. Considerable sickness, especially typhoid fever, prevailing in the town, we were called upon to make a number of examinations of waters from different sources. The general conclusion arrived at from the results of our examinations is that most of the wells are contaminated with sewage or with surface drainage and that very few of them can be regarded as yielding water which it is safe to employ for drink unless it has been first thoroughly boiled.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance. Turbidity.	Sediment.	Color.	Odor.	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
1542	Jacksonville, cont'd. (See foot	Oct. 19, '96	25	slight	little	.03	none	704.	72.4	631.6	white	42.	.9	none	.052	none	30.
1543	note upon preceding page.)	" 20,	35	"	"	.01	"	693.6	82.	611.6	"	63.	2.	"	.088	.004	16.5
1546		" 23,	20	none	none	.02	"	644.	46.4	597.6	"	68.	1.1	"	.014	none	12.8
1556		" 27,	25	"	little	.02	"	920.	99 2	820.8	"	143.	2.5	.001	.042	.011	40.
1557		" 27,	25	slight	"	.03	"	685 2	66.	619.2	"	117.	1.9	.001	.06	.005	27.
1558		" 26,	28	"	"	.02	"	840.	98.	742.	"	59.	1.2	.003	.044	.05	21.5
1559		" 26,	unkno'n	"	"	.02	"	264.	32.	232.	"	14.	1.4	none	.014	.006	35.
1618		Dec. 10,	city w'tr	"	"	.04	"	862.	24.	836.	gray	320.	4.	"	.21	.065	.9
1619		" 10,	23	none	"	.02	"	969.6	92	877.6	white	163.	1.7	.006	.09	.023	41.
1620		" 10,	32	d'cid'd	consid	y'l'w	"	433.2	17.2	416.	brown	7.1	3.6	2.24	.198	none	.01
1621		" 10,	cistern	"	little	.03	"	86.8	15.2	71.6	"	.9	7.5	.012	.162	.023	1.3
1634		" 14,	28	slight	"	.03	"	478.	40.	438.	white	34.	1.1	.002	.122	.007	9.
1635		" 16,	20	"	"	.01	"	396.	40.	356.	"	34.	1.1	.001	.03	.001	8.8
1636		" 16,	25	"	"	.03	"	352.8	48.	304.8	"	14.	2.1	.001	.038	.001	2.4
1637		" 16,	25	none	none	.02	"	568.8	76.8	492.	"	45.	1.1	.001	.024	none	16.
1640		" 17,	21	slight	little	none	"	776.8	72.	704.8	"	95.	1.3	none	.05	"	10.
1641		" 17,	21	"	"	"	"	456	44.	412.	"	22.	.9	.006	.046	.001	7.5
1724		" 14,	20	"	"	.02	"	618.4	104.	514.4	"	111.	1.6	none	.054	.007	34.
1725		" 14,	25	"	"	.03	"	429.2	64.	365.2	"	32.	1.1	.01	.032	.01	23.
1726		" 14,	23	none	"	.03	"	576.4	78.	498.4	"	71.	1.7	.001	.026	none	16.
1743		" 17,	30	slight	"	.06	"	265 2	24.8	240.4	"	15.	2.7	.009	.049	.006	7.
1745		" 17,	29	d'cid'd	consid	.08	"	539.6	42.8	496 8	"	33.	2.	.002	.086	.006	11.
1744		" 17,	24	none	none	.03	"	921.2	70.	851.2	"	158.	1.1	none	.032	.022	45.
1746		" 17,	23	slight	little	.03	"	263.6	34.8	228.8	"	19.	1.7	.002	.072	none	9 6
248	Joliet*....................	Dec. 10, '95	18	....	....	......	....*...	723.6	49.2	674.4	white	21.	1.	.003	.037	"	8.99
249		" 10,	city well	....	....	......	....	595.	18.	577.	"	7.	.9	.001	.042	"	.3
250		" 10,	Hickory creek	...	....	......	....	706.9	15.4	691.6	brown	3.75	3.4	.07	.084	"	.13
630		Mar. 25, '96	canal	....	....	......	....	508.4	27.2	481.2	"	58.	23.15	......	......	.16	1.37
631		" 25,	hydrant	....	....	......	....	-80.	34.	446.	white	9.	1.6	.01	.07	.002	4.
632		" 25,	20	....	....	......	....	743.6	38.4	705.2	"	30.	.6	.02	.038	none	13.
633		" 25,	30*d*	....	....	......	....	764.4	21.2	743.2	"	34.	1.	none	.11	"	17.
718		April 14,	55	....	....	......	....	1088.8	54.	1034.8	gray	52.	1.9	.482	.071	.08	7.
719		" 14,	75	....	....	......	....	1053.2	54.	999.2	white	43.	1.8	.002	.08	.06	13.
720		" 14,	100	....	....	......	....	730.	54.	676.	"	36.	.9	.024	.068	none	17.
740		" 20,	creek.	....	....	......	....	497.6	22.	450.6	brown	3.3	4.6	.05	.168	.025	1.2
741		" 20,	unkno'n	....	....	......	....	648.	40.	608.	gray	33.	1.2	none	.044	.001	15.

(Parts per 1,000,000.)

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance. Turbidity.	Sediment.	Color.	Odor.	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
742	Joliet, cont'd*.................	Apr. 20, '96	40*d*	....	....	......	....	518.	26.8	491.2	gray	8.	2.5	.014	.104	.016	1.4
743		" 20,	12	....	....	......	....	602.8	41.2	561.6	white	20.	1.05	none	.044	none	11.
968		June 11,	115	d'cid'd	consid	.05	none	530.8	30.	500.8	"	12.	3.6	.582	.06	.015	1.04
1167		July 22,	18	....	....	......	....	1139.6	73.6	1066.	"	80.	1.7	.274	.088	none	10.72
1168		" 22,	20	....	....	......	....	1628.4	114.4	1514.	brown	146.	5.1	.006	.28	"	22.
1169		" 22,	20	....	....	......	....	753.6	35.2	718.4	white	34.	2.1	none	.056	"	12.5
1170		" 22,	18	....	....	......	....	952.	16.8	935.2	brown	78.	2.9	4.248	.176	.01	1.76
1313		" 25,	18*d*	slight	little	none	none	755.2	55.2	700.	white	31.	1.5	.002	.054	none	15.
1314		" 25,	110*d*.	d'cid'd	"	.6	"	540.8	18.	522.8	brown	10.	1.3	1.04	.046	"	.06
1565		Oct. 27,	122	slight	"	.03	"	806.	80.	726.	white	5.1	1.1	.032	.056	"	1.2
1566		" 27,	tap art.	"	"	.03	"	490.	15.6	474.4	"	15.	2.3	.048	.072	.013	.5
1567		" 27,	103	d'cid'd	"	.07	"	539.6	30.	509.6	"	9.	1.8	.216	.07	none	.3
1568		" 27,	100	slight	"	.02	"	720.8	30.	690.8	"	25.	2.3	.004	.066	.018	1.9
1569		" 27,	1500	d'cid'd	"	.06	"	339.2	15.2	324.	"	69.	1.1	.72	.024	.011	.2
1570		" 27,	115	"	"	.04	musty	844.	48.	796.	"	34.	1.6	.016	.048	none	10.75
1594		Nov. 3,	city w'tr	slight	"	.02	none	494.4	25.2	469.2	brown	16.	1.5	.016	.07	.003	.5
1595		" 3,	66*d*	"	"	.01	"	450.3	26.	424.	white	4.9	1.7	.008	.068	.014	.6
1596		" 3,	15*s*	d'cid'd	"	.04	"	431.6	15.6	416.	"	1.6	1.2	.258	.048	none	.4
1689		Dec. 3,	8*s*	none	none	.03	"	696.8	22.	674.8	"	18.	1.	.016	.028	.001	4.7
1690		" 3,	15*s*	d'cid'd	little	.15	"	420.	29.2	390.8	"	1.7	.8	.252	.018	none	1.
1691		" 3,	12*s*	"	"	.07	"	441.2	30.	411.2	"	2.7	1.3	.176	.022	"	.15
530	Kankakee†.....................	Feb. 28,	40	....	....	......	....	488.	58.	430.	gray	30.	4.8	......	......	.013	9.
666		April 4,	river	....	....	......	....	247.6	17.2	230.4	black	2.1	13.	......	......	.013	.75
667		" 4,	hydrant	....	....	......	....	246.	14.	232.	"	1.9	12.9	......	......	.008	.7
685		" 6,	40	....	....	......	....	476.8	29.6	447.2	white	32.	1.1	......	......	none	9.5
686		" 6,	67	....	....	......	....	510.4	26.	484.4	red	.8	1.4	......	......	"	.06
398	Knoxville‡.....................	Jan. 16,	1350	....	....	......	....	1146.	12.	1134.	white	184.	1.5	......	......	.045	.1
1609		Nov. 7,	21	none	little	.01	none	333.6	32.8	300.8	"	5.1	1.3	.001	.046	none	2.5
1610		" 7,	13½	d'tinct	"	y'l'w	"	1146.	22.	1124.	brown	200.	2.7	.2	.038	.065	.2
1611		" 7,	unkno'n	none	"	.02	"	689.2	43.2	646.	white	73.	1.8	.034	.04	.025	18.5
1612		" 7,	30	"	"	.02	"	548.8	44.	504.8	"	53.	.8	.001	.038	none	16.
1660		" 23,	30	d'tinct	consid	y'l'w	"	452.	18.	434.	red	2.2	2.3	.56	.098	"	.3
1661		" 22,	19	slight	little	.02	"	650.8	68.	582.8	white	40.	1.1	none	.046	"	7.2
1662		" 23,	20	"	"	.01	musty	414.	30.	384.	"	20.	.7	.002	.038	"	3.2
1663		" 23,	22	"	"	.01	none	593.6	110.	483.6	"	81.	1.8	.004	.054	.05	11.2
1701		Dec. 5.	1350	d'tinct	consid	y'l'w	"	1204.8	23.2	1191.6	brown	191.	3.6	1.4	.012	.015	.1

*The Joliet waters were analyzed, some at the request of the water works authorities, some at the request of private citizens. In general here the ordinary well must be considered unsafe as a source of domestic supply since the analytical data show that the ground waters are contaminated with drainage from animal refuse.

†Three samples came from wells of various depths. Nos. 566 and 567 are samples of river water, one taken directly from the river, the other from a hydrant. The hydrant water and the river water are practically identical as was to be expected.

‡In response to requests from the health officer of Knoxville analyses of several well waters were made, three samples coming from the deep well which is the source of general city supply, and the others from ordinary shallow wells. Many of the shallow wells are evidently subject to the accession of drainage from animal refuse matters or sewage, and can not be considered safe for domestic use.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

ANALYSES OF POTABLE WATERS MADE AT THE REQUEST OF PRIVATE CITIZENS OR FOR HEALTH OFFICERS.

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Odor.	Residue on Evaporation. Total.	Residue on Evaporation. Loss on Ignition.	Residue on Evaporation. Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.
1734	Knoxville, cont'd (See foot note upon preceding page.)	Dec. 15, '96	24	none	little	.02	none	604.8	42.	562.8	white	50.	1.5	.004	.052	.001	16.
1735		" 15,	20	"	"	.03	"	668.	60.	608.	"	62.	1.	.004	.018	none	35.
1736		" 15,	108	d'tinct	"	y'l'w	"	497.2	44.	453.2	brown	1.4	.8	.96	.012	"	.15
1737		" 15,	1350	slight	"	.04	"	1135.2	18.	1117.2	white	188.	1.5	.016	.018	.65	5.
1740		" 16,	20	none	none	.02	"	478.	54.	424.	"	73.	1.	.008	.062	none	9.
1741		" 16,	26	"	"	.01	"	350.	32.	318.	"	47.	1.	none	.024	"	8.
1742		" 15.	ice	d'tinct	consid	.04	"	63.2	12.	51.2	brown	2.	8.3	.004	.406	.004	.3
1782		" 29,	1350	"	little	.02	"	1144.	16.	1128.	white	190.	1.9	.136	.008	.4	.14
1783		" 29,	1350	"	"	.03	"	1151.6	11.2	1140.4	"	190.	3.7	.124	.008	.95	.32
1784		" 29,	24	none	"	.02	"	1137.2	72.4	1064.8	"	70.	2.8	.002	.044	none	32.
1785		" 29,	1350	d'tinct	"	.03	"	1149.6	12.	1137.6	"	189.	3.6	.218	.062	1.15	.9
1094	Lake Forest	July 8,	180	....	....	......	....	257.2	9.2	248.	brown	32.	3.9	.096	.106	none	.1
1101		" 12,	lake	....	....	......	....	140.	26.	114.	"	3.2	2.5	.01	.06	"	.092
1521		Oct. 19,	70	slight	little	.04	none	325.2	10.	315.2	white	35.	3.	.022	.054	"	.2
598	LaMoille	Mar. 20,	280*b*	....	....	......	....	642.	16.	626.	brown	2.	24.7	......	......	"	.044
386	LaSalle	Jan. 10,	lake	....	....	......	....	335.6	31.6	304.	brown	10.	11.8	......	......	.16	6.5
433		" 27,	1345 art.	....	....	......	....	352.4	15.2	337.2	"	12.	11.8	......	......	.11	5.25
496		Feb. 17,	spring	....	....	......	....	348.	16.	332.	white	3.3	.6	......	......	none	3.2
927		Jun. 1,	city well	slight	little	.01	none	940.8	70.	870.8	"	25.	.85	.014	.11	"	3.
695	Litchfield	Apr. 10,	17	....	....	......	....	1938.4	74.	1864.4	gray	300.	3.4	.004	.146	.005	52.5
747	Lockport	" 20,	reserv'r	....	....	......	....	240.	30.	210.	"	2.55	2.9	......	......	.06	4.
748		" 20,	1922 art.	....	....	......	....	1547.6	11.6	1536.	white	710.	3.5	......	......	none	.86
1747		Dec. 18,	"	slight	little	.03	none	1905.2	86.	1819.2	"	910.	5.4	.8	.018	.024	.12
622	Long Grove	Mar. 23,	30	....	....	......	....	3076.	149.6	2826.4	"	222.	1.35	none	.042	.005	7.
1712	Long Creek	Dec. 11,	22	slight	little	.03	none	885.2	78.4	806.8	brown	69.	3.8	.522	.152	.06	36.
1713		" 11,	26	"	"	.02	"	1367.2	64.	1303.2	"	385.	3.4	.002	.072	.003	44.
896	Macomb	May 25,	35	....	....	......	....	256.	14.	242.	white	7.	.7	.048	.066	.006	.6
1040		Jun. 25,	35	....	....	......	....	267.2	13.2	254.	"	3.2	1.3	.078	.038	none	.4
643	Manteno	Mar. 30,	36	....	....	......	....	472.	40.	430.	gray	32.	1.3	.082	.074	.018	.27
644		" 30,	64	....	....	......	....	598.	61.6	536.4	"	28.	.9	.048	.004	.004	26.
727	Mason City	Apr. 18,	195	....	....	......	....	276.	15.2	260.8	brown	1.2	1.3	......	......	none	.03
912	Mattoon*	May 30,	....	slight	little	.03	none	1004.8	92.8	912.	white	164.	1.8	.014	.11	.06	17.
1039		Jun. 25,	15	....	....	......	....	700.8	88.	612.8	"	97.	2.4	.038	.056	.009	23.
1063		July 1,	25	....	....	......	....	470.	60.	410.	"	14.	1.3	.39	.046	.01	1.
1064		" 1,	16	....	....	......	....	476	34.	442.	"	8.	2.	.006	.108	.007	5.
1065		" 1,	14	....	....	......	....	910.8	84.	826.8	gray	97.	1.6	.002	.054	.002	14.5

(Parts per 1,000,000.)

Number.	City or Town.	Date of Collection.	Depth of Well.	Turbidity.	Sediment.	Color.	Odor.	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
1066	Mattoon, cont'd*	July 2, '96	30	....	....	......	....	7632.8	240.	7392.8	brown	164.	261.	4.92	5.4	none	3.
1372		Sep. 14,	72	decid.	consid	y'l'w	none	746.4	24.	722.4	"	5.5	9.	12.4	.22	"	.068
1373		" 14.	60	"	little	"	"	452.8	28.	424.8	"	15.	6.1	10.	.168	"	.048
1277	Metropolis†	July 12,	50	slight	consid	.02	"	613.6	50.4	563.2	white	215.	2.4	.026	.074	.05	12.5
1278		" 12,	50	"	little	none	"	436.	20.	416.	"	108.	2.3	.018	.07	.002	11.
1279		" 12,	45	"	"	.01	smoky	425.6	47.2	378.4	"	132.	3.2	.048	.098	.001	11.5
1280		" 12.	55	"	"	.02	none	227.6	50.	177.6	"	63.	1.2	.002	.014	.001	3.5
77	Montgomery	Oct. 14, '95	flowing well.		....	......	....	384.6	15.4	369.2	....	3.3	.2	.496	.038	none	.1
682	Mt. Morris	Apr. 6, '96	60	....	....	......	....	2169.2	133.2	2036.	white	1000.	1.8	......	......	"	10.
1510	Muncie	Oct. 15,	24	slight	little	.05	musty	1323.6	178.	1245.6	"	205.	3.5	.147	.098	.325	58.
628	Nokomis	Mar. 24,	32	....	.....	......	....	334.8	16.8	318.	"	9.	1.4	....	......	.05	1.6
1693	Newman	Nov. 4,	72*f*	decid.	consid	.3	none	474.	26.8	447.2	brown	12.	8.5	1.36	.152	none	.01
724	Odell	Apr. 15,	168	....	....	......	....	403.2	6.4	396.8	"	115.	2.8	......	......	"	.1
764	Ohio	" 25,	389	....	....	......	....	316.	14.	302.	"	2.2	6.7	......	......	"	.09
815	Onarga	May 6,	145*a*	....	....	......	....	1566.	81.2	1484.8	white	65.	1.5	.02	.07	.035	.5
816		" 7,	103*a*	....	....	......	....	948.	44.	904.	gray	10.	1.5	1.2	.46	none	.45
1444	Ottawa‡	Oct. 5,	750*a*	slight	little	.03	none	358.8	24.	334.8	white	16.	1.	.424	.006	"	.02
1495		" 13,	1030*a*	"	"	.02	"	346.4	23.2	323.2	"	16.	1.1	.4	.032	"	.06
1507		" 14,	1190*a*	"	"	.05	"	446.6	16.	425.6	brown	23.	1.6	.64	.022	"	.06
1508		" 13,	1115*a*	none	"	.04	"	368.	20.8	347.2	"	24.	1.2	.72	.016	"	.06
1645		Nov. 17,	20	slight	"	.01	"	768.	36.	732.	white	33.	1.9	.006	.082	.012	30.
1646		" 17,	22	"	"	.02	"	490.8	30.	460.8	"	17.	1.4	.01	.062	.017	6.
55	Pana	Oct. 6, '95	city water sup'y		....	......	....	315.2	22.7	292.5	....	5.	.7	.24	.004	none	.04
709		Apr. 14, '96	19	....	....	......	....	1053.2	54.	999.2	white	43.	1.8	......	......	.16	13.
847	Paris§	May 14,	30*d*	....	....	......		630.	20.8	609.2	brown	3.9	14.1	......	......	none	.04
994		Jun. 17,	30*a*	decid.	consid	y'l'w	none	620.8	26.	594.8	"	5.1	14.	.19	.4	"	.2
1027		" 23,	30	....	....	......	....	1118.	96.	1022.	white	180.	3.2	.014	.058	.06	17.5
29	Peoria‖	Sept. 29, '95	old well (water works				....	418.8	26.2	392.6	white	33.	1.35	.004	.044	none	.596
30		" 29,	new city well (water works)				....	332.6	17.	315.6	"	17.	1.88	none	.026	"	.2
329		Dec. 27,	lower public well				....	1298.8	71.6	1227.2	"	93.5	.95	......	......	.01	18.
330		" 27,	upper public well				....	1949.6	29.6	1920.	"	318.	1.3	......	......	.001	70.
361		Jan. 7, '96	old well (water works)				....	364.8	15.6	349.2	brown	24.	1.1	......	......	.002	3.4

*Several of the samples from Mattoon came from shallow wells. Nos. 1372 and 1373 came from the deep drift wells which yield the city supply and they manifest marked differences from the shallow well waters.

†Four analyses were made at the request of the health officer; the results of the analyses were such as to lead to grave suspicion that the waters were contaminated with drainage from refuse matters.

‡Analyses Nos. 1444, 1495, 1507, and 1508 were of samples taken from the new artesian well at the various depths indicated. The well is intended as a source of city supply. The other two samples, the analyses of which are here recorded, were from ordinary shallow wells.

§No. 1027 comes from a shallow well; Nos. 847 and 994 are samples from a thirty foot flowing well. The water from this real artesian well evidently comes from lower drift strata and is very similar in character to waters used in other places, drawn from deeper wells, but coming from strata of the same sort.

‖The health officer sent us samples of city water and also samples from several shallow wells used by people of the neighborhood for domestic supply. The shallow wells are unmistakably contaminated with drainage from refuse animal matters.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance: Turbidity.	Appearance: Sediment.	Appearance: Color.	Odor.	Residue on Evaporation: Total.	Residue on Evaporation: Loss on Ignition.	Residue on Evaporation: Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.
362	Peoria, cont'd.	Jan. 7, '96	new well at water works				*	350.	18.	332.	brown	11.	2.9			.12	4.32
555		Mar. 9,	sulphur spring at park					3091.2	12.4	3078.8	white	1380.	7.1			none	.152
1304		Sept. 20,	40					365.6	16.	349.6	brown	9.	3.9	.24	.72	"	.02
491	Peru	Feb. 13,	700*a*					4261.6	25.6	4236.	white	2260.	4.8			"	.12
545	Plano	Mar. 4,	14					332.	32.	300.	brown	5.	.82			"	.7
561		" 9,	14					328.	46.	282.	gray	2.15	1.5			"	.7
754	Polo	" 22,	78					346.8	12.8	334.	red	.6	1.3	.5	.032	"	.048
694	Pontiac*	" 9,	city wat.					346.8	30.4	316.4	white	3.4	3.6	.006	.11	.04	5.
728		April 17,	18					456.	25.6	430.4	"	25.	1.			.003	15.62
940		" 4,	14	consid	little	.03	none	534.8	66.4	468.4	"	53.	1.7	.002	.11	.007	19.
1004		June 19,	42					846.	6.	840.	"	65.	2.	.324	.036	none	.3
184	Potomac	Nov. 9, '95	125 art'n					1331.4	64.8	1266.6	brown	29.		.966	.012	"	.134
185		" 9,	80 "					1226.4	68.4	1218.	"	24.5		.58	.062	"	.62
71	Quincy†	Oct. 14,	city supply, river water					190.	28.8	161.2		1.6	14.5	.02	.464	"	.1
72		" 14,	Miss. river water, filtered					155.2	16.6	138.6		2.3	12.	.016	.344	"	.1
167		Nov. 6,	" " " "					156.4	3.	153.4		2.9	4.55	.01	.252	"	.12
168		" 6,	" " " not filtered					162.2	3.6	158.6		3.3	8.2	.01	.168	"	.24
242		Dec. 2,	" " "					198.6	3.2	195.4		3.8	7.6	.037	.512	"	.14
573		Mar. 11, '96	filtered, city supply					188.	10.	178.		3.1	6.7			.035	2.2
574		" 11,	pump well of city water works					226.4	12.4	214.		2.9	7.8			.09	2.3
1129		July 16,	" " " " "					209.2	20.	189.2		1.85	13.3	.046	.48	none	.15
1130		" 16,	filtered, city supply					166.	16.	150.		1.9	10.9	.18	.32	"	.1
1172		" 24,	pump well, city water works					218.	18.	200.		1.8	12.2	.024	.36	.001	.2
1173		" 24,	filtered, city supply					182.8	18.	164.8		1.9	8.3	.016	.22	none	.225
1203		" 30,	" " "					165.2	6.8	158.4		1.9	6.7	.024	.22	"	.2
1204		" 30,	pump well, city water works					226.4	20.	206.4		1.9	12.5	.052	.4	.001	.1
1229		Aug. 6,	filtered, city supply					215.6	18.	197.6		2.3	6.2	.006	.24	.001	.5
1230		" 6,	pump well, city water works					449.6	21.2	428.4		2.2	15.2	.02	.56	.04	.5
1285		Aug. 14,	pump well, city water works					236.	8.	228.		2.6	11.2	.024	.4	.036	.45
1286		" 14,	filtered city supply					193.2	12.4	180.8		2.5	6.7	.024	.5	none	.5
403		Jan. 19,	artesian well					1728.8	132.	1696.8	brown	255.	2.		*	.07	55.9
430		" 26,	" "					1787.2	62.	1725.2	"	256.	2.7			.07	65.
936		June 2,	underground river					2935.2	194.	2741.2	white	1250.	4.	.03	.062	.06	26.
1446		Oct. 6,	" "					2550.6	392.	2168.6	"	1040.	3.5	.032	.084	.03	33.
920	Ransom	May 27,	30	slight	little	.03	cherry	668.	52.	616.	"	18.	1.7	none	.09	.008	25.
1155	Ridgway	July 21,	21					298.	26.8	271.2	"	2.4	.4	.006	.04	.001	2.

(Parts per 1,000,000.)

Number.	City or Town.	Date of Collection.	Depth of Well.	Turbidity.	Sediment.	Color.	Odor.	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
1606	Roanoke	Nov. 3, '96	23	much	much	m'dy	none	4290.8	236.	3954.8	brown	219.	7.1	.006	.108	.05	76.
65	Rochelle‡	Oct. 12, '95	bored well					291.8	44.6	247.2		2.7	6.6	.022	.28	none	.012
66		" 12,	city reservoir					549.2	80.2	469.		37.	2.3	.028	.32	.02	7.98
114		" 25,	well					291.2	12.	279.2		2.6	6.8	.006	.362	none	none
115		" 25,	reservoir					338.6	18.2	320.4		9.5	8.1	.226	.572	.1	.234
116		" 25,	tile works well					291.6	27.6	264.		2.5	.6	.012	.04	none	5.5
117		" 25,	Vollen well					357.2	8.6	348.6		1.2	2.	.026	.046	"	.174
154		Nov. 4,	city reservoir					540.6	89.4	451.2	white	37.5	.85	.04	.15	.01	7.
155		" 4,	well					966.2	41.6	924.6	brown	21.5	10.5	.11	.258	.42	1.69
156		" 4,	well					834.	48.4	785.6	"	30.	9.65	.42	.33	.4	1.98
864	Rock Falls§	May 18, '96	city sup.					346.	38.	308.	white	8.5	.7			none	.2
865		" 18,	30*d*					246.	28	218.	"	3.5	.35			"	4.6
983		Jun. 15,	28	none	none	none	none	274.	27.	247.	"	11.	.4	none	.024	"	6.
984		" 15,	18	"	"	.02	"	546.	62.	484.	"	52.	1.	.004	.058	.001	23.
985		" 15.	32	slight	little	.02	"	796.	51.2	744.8	"	53.	1.9	.002	.072	.001	43.
982		" 15.	32	none	none	none	"	304.	36.	268.	"	12.	1.1	none	.02	none	6.
1052		" 29,	19					372.	35.6	336.4	"	19.	.8	.002	.014	"	13.
1053		" 29,	22					350.	30.	320.	brown	35.	3.5	.032	.12	.04	9.
1054		" 29,	16*d*					570.	36.	534.	white	42.	.8	none	.038	none	23.5
1055		" 29,	25					278.	44.8	233.2	"	10.	.8	.014	.036	"	7.5
1110		July 13,	25					1208.	96.	1112.	"	203.	1.5	.002	.084	.015	25.
1111		" 13,	75					452.8	52.	400.8	"	41.	.8	.002	.022	.002	13.
1112		" 13,	30					304.4	46.4	258.	"	18.	.3	none	.02	.001	5.
1113		" 13,	unkno'n					394.8	42.	352.8	"	25.	.5	.001	.046	.001	13.
1197		" 30,	30	slight	little	.01	none	596.	45.6	550.4	"	44.	1.1	none	.05	none	25.
1198		" 30,	21*d*	none	none	none	"	345.	60.	285.	"	14.	.6	.006	.026	"	6.
1199		" 30,	unkno'n	"	little	.02	"	484.	42.	442.	"	31.	2.2	.012	.04	.001	14.5
1200		" 30.	"	slight	"	.02	"	397.6	38.4	359.2	"	21.	1.1	.014	.034	.001	6.
1201		" 30,	23	none	none	none	"	279.2	20.	259.2	"	9.	.6	.012	.022	none	2.4
1202		" 30,	26	slight	little	.01	"	641.6	44.	597.6	"	39.	.9	.01	.056	"	20.5
1268		Aug. 10,	32	decid.	little	red	none	1049.6	118.4	931.2	brown	102.	2.5	.002	.92	.005	55.
1269		" 10,	35	none	none	none	"	254.8	20.8	234.	white	3.5	.8	none	.02	none	2.4
1270		" 10,	20	slight	little	.02	"	461.6	20.	441.6	"	31.	1.3	"	.03	"	15.
1271		" 10,	70	"	"	.02	"	641.6	30.	611.6	"	43.	1.3	.002	.028	"	22.
1272		" 10,	27	none	none	.02	"	1094.8	56.	1038.8	"	49.	2.8	.002	.08	"	35.
1273		" 10,	24	"	"	.01	"	449.6	32.	417.6	"	27.	1.3	.006	.032	"	14.

*Number 694 came from the city supply. The other samples came from ordinary shallow wells.

†Numbers 1129, 1172, 1204, 1230, and 1285 were sent to us at our own request; the others were sent, some by private citizens, some by the superintendent of the waterworks.

‡The water supply of Rochelle being in unsatisfactory condition, we were requested by the mayor of the city to make examinations of water from the sources in use, and also from certain other sources which were proposed as substitutes.

§The health officer asked for analyses of water supply because typhoid fever and diphtheria were prevalent in the town. A large number of the well waters examined were shown to be unsafe for domestic use.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Odor.	Residue on Evaporation. Total.	Residue on Evaporation. Loss on Ignition.	Residue on Evaporation. Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.
1143	Rock Island‖	July 20, '96	artesian well at postoffice					1606.	28.	1578.	gray	600.	4.2	1.68	.042	none	1.4
1144		" 20,	well at court house					364.8	22.	342.8	white	2.	1.4	.148	.032	.001	.5
1145		" 20,	spring ‖					690.	62.	628.	"	39.	3.	.002	.072	none	11.5
1146		" 20,	30 (typhoid)					1044.	108.	936.	"	82.	2.2	.032	.116	.014	39.
1147		" 20,	12 "					1314.	124.	1190.	white	137	3.5	1.154	.146	none	38.
1148		" 20,	Miss. river, water works inlet.					204.	20.	184.	brown	1.7	12.4	.16	.4	.001	.3
1149		" 20,	" " " " "					203.6	20.	183.6	"	1.6	12.6	.044	.4	none	.2
1150		" 20,	filt. Miss. river water from tap					188.	20.	168.	"	1.6	11.8	.04	.4	.002	.3
1419		Sep. 26,	22	slight	little	none	none	469.6	32.	437.6	white	28.	1.5	.001	.026	none	10.5
1714		Dec. 11,	c'nd'ns'r	decid.	consid	.4	"	240.	17.2	222.8	brown	65.	6.7	3.2	.152	"	.12
1715		" 11,	1700	none	none	.35	"	1105.2	60.	1045.2	white	300.	2.7	1.44	.024	"	.12
564	Rockford*	Mar. 10,	Rock river water					298.	18.4	279.6	brown	1.7	12.5	.45	.638	.04	1.3
1481		Oct. 9,	" " "					294.8	20.	274.8	"	2.6	7.9	.024	.328	.017	.6
650		Mar. 30,	hydrant					297.6	28.	269.6	white	2.5	.45	none	.002	none	.076
651		" 30,	"					292.8	26.8	266.	"	2.3	.45	"	.002	"	.12
652		" 30,	"					290.	22.	268.	"	2.3	.35	.006	.006	"	16
653		" 30,	"					292.4	23.2	269.2	"	2.5	.4	.006	.005	"	.12
733		Apr. 17,	"					294.4	14.	280.4	"	2.4	.4	.006	.008	"	.14
736		" 17,	dead end water main					382.8	61.2	321.6	"	13.	.5	none	.019	"	3.2
776		" 29,	" " "					296.	40.	256.	"	2.7	.4	"	.002	"	.05
842		May 14,	hydrant					301.6	32.	269.6	"	3.	.5	.012	.014	"	.3
860		" 18,	dead end water main					302.	42.	260.	"	2.8	.8	.008	.016	"	.15
862		" 18,	" " " "					309.2	59.2	250.	"	2.7	.35	.001	01	"	.15
902		" 26,	" " " "					294.8	48.	246.8	brown	2.7	.6	.012	.06	"	.1
904		" 26,	" " " "					292.	24.	268.	white	3.	.75	.001	.022	"	.3
1001		June 17,	hydrant					294.	30.	264.	brown	3.3	.8	.002	.01	"	.2
565		Mar. 9,	ground water at water works					334.4	44.8	289.6	white	7.5	.7	.02	.02	.001	1.8
566		" 10,	artesian reservoir					294.8	12.4	282.4	"	2.4	.6	.03	.023	none	.1
1480		Oct. 9,	artesian well					342.	38.	304.	"	70.	1.4	.04	.024	.001	.5
567		Mar. 10,	17¼					311.6	45.2	266.4	gray	2.45	3.75	.015	.164	none	.1
621		" 24,	20					475.2	14.4	460.8	white	17.	.4	none	.026	"	7.5
624		" 24,	18					334.	33.2	300.8	"	9.	.4	.01	.018	"	3.5
734		Apr. 17,	65					292.	40.	252.	"	2.3	.4	none	.005	"	.1
735		" 17,	90					308.8	44.	264.8	"	4.55	.4	.005	.01	"	6.
774		April 29,	40 open					538.	28.	510.	"	31.	1.1	.01	.5	"	1.2
775		" 29,	60 driv'n					349.2	35.6	313.6	"	9.5	.7	.002	.024	"	1.3
777	Rockford, cont'd*.	April 29, '96	57					388.8	37.6	351.2	white	13.	1.	.005	.01	none	3.25
840		May 14,	25					320.	20.8	299.2	"	6.	.3	none	.012	"	2.2
841		" 14,						410.8	30	380.8	"	10.	1.4	.026	.044	.007	6.4
843		" 14,	25					450.	44.	406.	"	15.	.7	.002	.034	none	6.8
861		May 18,	30					924.8	66.	858.8	"	67.	1.	.002	.04	.003	26.
863		" 18,	55					326.	26.	300.	"	12.	1.25	none	.022	.003	4.
901		" 26,	50					548.	40.	508.	"	35.	.7	.01	.102	.005	18.5
903		" 26,	75 in r'ck					442.8	58.4	384.4	"	24.	.7	.002	.052	none	18.
998		June 16,	60					974.	124.	850.	"	92.	1.9	.02	.102	.009	5.5
999		" 16,	30					412.	56.	356.	"	17.	2.3	.014	.09	.011	7.5
1000		" 16,	20					416.	48.	368.	gray	22.	1.3	none	.046	none	5.8
1479		Oct. 9,	25					344.	32.	312.	white	14.	1.1	"	.016	"	4.5
1478		" 9,	cistern					73.2	12.	61.2	black	1.4	7.9	.004	.224	"	.3
696	Seaton.	April 4,	109					437.2	14.8	422.4	brown	1.6	2.6	.044	1.7	"	.064
897	Shiloh Centre	May 27,	68 tub'l'r					384.8	36.8	348.	white	1.	1.2	14	.03	"	.04
770	Shirland	April 24,	54					363.6	28.	335.6	"	1.8	.5	.003	.014	"	.6
771		" 24,	25					426.	38.	388.	"	35.	1.4	.5	.046	"	.3
182	Sidney	Nov. 11, '95	tubular					344.8	8.8	336.	black	3.25	3.85	1.404	.13	"	none
16	Springfield	Sept. 16,		none	none	none	none	200.8	44.	156.8	gray	.5	.7	.012	.056	none	.388
350		Dec. 26,	33					987.6	7.2	980.4	brown	210.	5.4			.011	.6
462		Feb. 5, '96	33					542.	8.	534.	"	204.5	4.2			.035	.154
690		April 8,	25					1402.8	96.	1306.8	white	108.5	.9	none	.023	.001	57.5
691		" 8,	26					398.8	27.2	371.6	"	11	1.5			none	8.5
825		May 8,	spring					405.6	37.6	368.	"	8.	.9			"	1.
1056		June 30,	35					656.	60.	596.	"	48.	1.2	.006	.046	.005	2.4
1141		July 20,	30					1430.8	104.	1326.8	"	162.	2.	.002	.048	.008	50.
1191		" 30,	20					660.	72.	588.	gray	81.	4.1	.008	.086	.1	13.
1192		" 30,	30	decid.	little	.4	none	1068.8	52.8	1016.	brown	58.	3.4	.328	.078	.001	.5
1193		" 30,	28	none	none	.02	"	588.	24.	564.	white	9.	1.4	.232	.028	none	.5
1194		" 30,		decid.	little	7	"	679.6	18.8	660.8	gray	166.	5.	.184	.092	.001	5
1195		" 30,	28	none	none	none	"	1004.8	62.	942.8	white	38.	1.5	.004	.036	none	1.
1196		" 30,	26	slight	little	.02	"	1114.8	48.	1066.8	"	30.	1.6	.012	.052	"	4.
1225		Aug. 5.	16.5	none	"	.01	"	794.8	74.	720.	"	48.	1.5	.008	.042	.003	19.4
1157	Sterling†	July 20.	26					989.2	47.2	942.	"	75.	.8	none	.046	none	16.5
1153		July 20.	28					1439.2	98.4	1340.8	"	180.	1.5	"	.078	"	60.
1159		" 20,	28					1190.	114.8	1075.2	"	161.	1.9	.008	.12	.001	38.
1160		" 20,	20					863.2	50.4	812.8	"	88.	1.1	.002	.078	none	35.
1161		" 20,	25					312.8	36.	276.8	brown	14.	.8	.02	.064	.002	4.
1162		" 20,	15					1403.2	155.2	1248.	white	114.	1.1	none	.09	none	55.
1233		Aug. 5,	25	slight	little	.01	none	1092.4	94.	998.4	"	77.	2.7	.001	.07	.001	17.5

(Parts per 1,000,000.)

*The waters from Rockford were sent by the health commissioner and included specimens from the city supply as well as from private supplies.

†The waters from Sterling were sent to us by the health officer because of the prevalence of typhoid fever. There seems to have been good reason to suspect them of contamination.

‖The samples from Rock Island were sent to us by the health officer with the statement that typhoid fever prevailed in the town. No. 1714 consists in part of condensed steam with, with some of water No. 1715.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

Number.	CITY OR TOWN.	Date of Collection.	Depth of Well.	Appearance.			Odor.	Residue on Evaporation.			Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as			
				Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.				Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
1234	Sterling, cont'd	Aug. 2, '96	45	decid.	little	.04	none	364.	10.	354.	brown	11.	1.5	.016	.012	none	1.
1235		" 4,	25	slight	"	none	"	826.	90.	736.	white	59.	1.5	.001	.038	"	16.
1236		" 5.	22	"	"	.02	"	726.	56.	670.	"	35.	.8	.002	.054	"	16.5
1237		" 4,	35	"	"	.03	"	745.6	56.	689.6	"	82.	1.1	.024	.064	"	17.5
1238		" 6.	22	"	"	.02	"	830.8	66.	764.8	"	55.	1.9	.002	.06	.001	25.
1281	St. Paul	" 12,	31	decid.	"	.4	"	422.4	19.2	403.2	brown	10.	4.5	.72	.162	none	.04
1282		" 12,	15	slight	consid	.04	"	554.8	8.	546.8	white	29.	1.5	.01	.042	.007	8.5
932	Streator*	June 2,	Vermilion river.				......	398.	17.6	380.4	brown	4.2	5.5	.024	.214	.035	5.2
933		" 2,	city water, tap..			......	......	360.	13.2	346.8	"	4.2	3.	.004	.132	none	5.5
1017		" 22,	"	"	" ..	......	......	378.	44.	334.	"	4.6	4.5	.012	.096	"	3.5
1092		July 9,	"	"	" ..	......	......	336.	30.	306.	"	5.5	3.2	.002	.116	"	2.
1214		Aug. 1,	"	"	" ..	......	......	367.6	22.	345.6	"	3.2	4.9	.004	.2	.001	3.5
1246		" 7,	"	"	" ..	......	......	334.	30.	304.	"	4.3	3.4	.002	.086	none	2.58
1489		Oct. 9,	"	"	" ..	......	......	378.	22.8	355.2	"	3.5	2.3	.006	.066	"	2.8
680		April 6,	21	......	......	......	......	1000.8	57.2	943.6	gray	55.	1.8	none	.074	"	7.
1018		Jun. 22,	27	......	......	......	......	2130.	136.	1994.	white	290.	3.6	.022	.088	.009	50.
1091		July 8.	16	......	......	......	......	396.8	26.	370.8	brown	10.	5.6	.006	.184	.001	3.5
1215		" 30,	30	slight	little	none	none	1276.4	78.	1198.4	white	59.	1.2	.008	.054	.002	19.
1247		Aug. 7,	spring	decid.	"	.01	"	413.6	24.	389.6	"	3.2	1.5	.004	.024	.001	.35
1490		Oct. 9,	27	none	"	.03	"	1708.	50.	1658.	"	34.	2.7	none	.06	.001	7.
1491		" 9,	233d	slight	none	.04	gas	1278.4	13.6	1264.8	"	66.	3.8	.604	.042	none	.15
1615	St. Joseph	Nov. 11,	30	decid.	consid	.04	none	362.8	16.8	346.	brown	8.	4.6	.88	.2	"	.5
1616		" 11,	28	slight	little	.02	"	947.6	74.8	872.8	white	112.	1.3	.002	.072	.006	55.
1678	Stonington	" 30,	20	"	"	.03	"	476.	18.2	457 8	"	34.	2.9	.08	.108	.014	2.8
475	Sullivan	Feb. 8,	300	......	......	......	......	836.	29.2	806.8	brown	213.	6.3	......	......	none	.06
824	Sycamore	May 8,	spring	......	......	......	......	297.6	32.	265.6	white	3.8	.9	none	.02	none	9.
319	Thomasboro	Dec. 26, '95	......	......	......	......	......	389.2	20.4	368.8	brown	11.	1.4	......	......	"	.04
320		" 26,	......	......	......	......	......	387.6	20.4	367.2	"	4.	.7	......	......	.002	.2
674	Toledo	April 4, '96	......	......	......	......	......	3353.2	24.	3359.2	"	1250.	24.5	......	......	none	.16
1205	Tolono	Aug. 1,	144d	decid.	little	.1	none	652.8	28.	624.8	brown	5.3	13.8	7.	.294	none	.088
1433	Topeka	Sep. 30,	45	slight	"	none	"	212.8	40.	172.8	white	1.6	1.	.003	.017	"	4.
1434		" 30,	35	"	consid	.02	"	306.	27.6	278.4	"	10.	1.8	.003	.04	.011	5.5
26	Urbana†	" 26, '95	28	none	none	none	"	201.2	20.8	180.4	"	14.	.5	.008	.026	none	2.39
354		Jan. 6, '96	......	......	......	......	......	404.8	58.8	346.	"	21.	.6	......	......	.001	22.
449		Feb. 3,	34	......	......	......	......	580.8	54.	526.8	"	58.	.6	......	......	none	20.

(Parts per 1,000,000.)

Number.	CITY OR TOWN.	Date of Collection.	Depth of Well.	Turbidity.	Sediment.	Color.	Odor.	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
496	Urbana, cont'd†	Feb. 5, '96	22	......	......	......	......	618.4	44.	574.4	white	44.5	1.7	......	......	.001	18.
477		" 11,	30	......	......	......	......	361.6	14.4	347.2	brown	12.	.3	......	......	none	.15
483		" 13,	35	......	......	......	......	341.2	17.2	324.	"	7.	.6	......	......	"	.45
513		" 25,	16	......	......	......	......	482.	32.	450.	white	80.5	.6	......	......	.014	37.5
514		" 25,	21	......	......	......	......	544.	62.	482.	"	67.5	1.15	.022	.056	none	18.
543		Mar. 6,	......	......	......	......	......	720.8	45.2	675.6	"	13.75	1.15	none	.026	.004	2.
645		" 31,	30	......	......	......	......	548.	53.6	494.4	"	51.	1.1	......	......	.006	12.
802		May 6,	14	......	......	......	......	354.	25.2	328.8	"	19.	.4	.016	.01	.014	1.5
1260		Aug. 12,	12	decid.	little	.06	none	424.8	18.4	406.4	"	7.	1.	.03	.026	.001	.02
1315		" 27,	18	"	"	.04	musty	196.	28.8	167.2	brown	29.	2.6	.17	.086	.13	4.7
1323		" 29,	......	slight	"	.04	"	804.	45.2	758.8	gray	79.	5.8	.462	.182	1.	8.53
1324		" 31,	26	"	"	.07	none	314.8	12.	302.8	white	5.	2.1	.002	.07	none	.08
1335		Sept. 2,	18	decid.	"	.1	"	434.8	30.	404.8	gray	25.	1.2	.028	.022	"	.2
1344		" 5,	32d	"	"	.5	musty	452.	14.	438.	brown	21.	1.5	.104	.024	"	.4
1350		" 7,	22	slight	"	.03	none	368.8	36.	332.8	white	23.	1.	none	.018	"	15.2
1365		" 11,	35	decid.	"	.04	"	756 8	60.	696.8	brown	55.	1.1	.024	.06	"	.3
1411		" 26,	40	little	"	.01	"	684.4	62.	622.4	white	57.	1.6	.001	.054	.001	8.
1420		" 29,	99	slight	"	.02	"	309.6	20.	289.6	"	2.1	1.6	.44	.032	none	.04
1421		" 29,	14	"	"	.01	putrid	360.4	14.	346.4	"	15.	1.3	.068	.07	.04	.9
1422	Utica	" 26,	28	"	"	.03	none	821.6	44.	777.6	white	8.	2.3	.04	.054	015	4.
737	Vermont	Apr. 18,	pond	......	......	......	......	278.4	22.4	256.	black	3.3	10.5	......	......	.075	.8
738		" 18,	700	......	......	......	......	4314.	10.	4304.	white	2325.	4.8	......	......	none	.04
739		" 18,	2400	......	......	......	......	3249.6	64.	3185.6	brown	1150.	7.	......	......	"	.05
1126		" 20,	18	......	......	......	......	1632.	88.	1544.	white	305.	1.3	.012	.106	"	96.
1351		Sept. 7,	155d	slight	little	.04	none	502.8	12.	490.8	gray	10.	3.	1.76	.048	"	.032
809	Viola	May 6,	artesian	......	......	......	......	1130.	114.	1016.	white	14.8	2.1	......	......	none	.1
872	Walnut	" 20,	37	......	......	......	......	903.2	80.	823.2	"	45.	1.2	......	......	.02	58.
873		" 20,	42	......	......	......	......	1470.	86.	1384.	"	280.	1.6	......	......	.003	35.
176	Warren	Nov. 8, '95	900	......	......	......	......	354.8	22.8	332.	"	3.45	.25	.004	.024	.015	.24
1290	Warrenville	Aug 16, '96	8	none	little	none	none	349.6	32.	317.6	"	7.	1.5	.02	.064	none	3.
1291		" 16,	3s	"	"	"	"	433.6	22.	411.6	"	7.	.9	.008	.038	"	4.2
1292		" 16,	4s	"	"	"	"	431.6	28.	403.6	"	8.	1.6	.06	.082	"	5.
148	Waukegan‡	Nov. 4, '95	shallow	......	"	......	......	745.2	94.6	650.6	"	49.	1.2	.01	.118	.001	20.99
149		" 4,	city supply, Lake Michigan..				......	139.4	21.	118.4	brown	2.9	1.1	.02	.128	none	.1
150		" 4,	"	"	"	" ...	......	148.4	3.4	145.	white	2.9	1.1	.01	.095	"	.06
215		Nov. 21,	"	"	"	"	......	145.8	4.	141.8	brown	2.6	1 15	.005	.083	none	.12
225		" 26,	"	"	"	"	......	138.6	......	......	white	3.	1.55	.122	.206	"	.14
275		Dec. 16,	"	"	"	"	......	173.2	8.4	164.8	"	2.85	2.2	.015	.119	"	.12

*The waters from Streator were sent to us by the health officer; they came in part from the city supply which is drawn from the Vermilion river, and the rest from wells.

†The waters from Urbana were analyzed at the request of various citizens; the results show that a large proportion of the wells receive sewage or surface drainage.

‡The samples of water from Waukegan, excepting number 149, came from the city supply, which is drawn from Lake Michigan. They were sent to us by the Mayor of the city, for the purpose of detecting any changes in the character of the water which might be due to the directions of the wind.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

ANALYSES OF POTABLE WATERS MADE AT THE REQUEST OF PRIVATE CITIZENS OR FOR HEALTH OFFICERS.

Number.	City or Town.	Date of Collection.	Depth of Well.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Color.	Residue on Evaporation. Total.	Residue on Evaporation. Loss on Ignition.	Residue on Evaporation. Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.
1034	Wenona	June 25, '96	1757 art.	......	......	......	......	1304.	24.	1280.	gray	480.	2.9	1.3	.018	.02	.1
995	White Heath	" 16,	......	decid.	little	.4	none	428.	22.	406.	brown	2.	5.1	1.2	.14	.001	.14
939	Wilmington	" 4,	43	"	"	.02	"	514.	26.4	487.6	white	52.	1.2	.476	.038	none	.075
1289		Aug. 17,	830*a*	none	"	none	"	1004.	20.	984.	"	250.	2.7	.924	.018	"	1.2
1352		Sept. 7,	43*d*	slight	"	.04	"	492.8	25.	467.8	"	39.	1.4	.486	.034	"	.1
600	Woodstock	Mar. 20,	artesian	......	......	......	......	398.8	42.4	356.4	brown	1.7	2.7	1.61	.134	"	.15
601		" 20,	"	......	......	......	......	386.8	8.4	378.4	white	4.5	2.7	......	......	"	.15
701	Wyoming*	April 11,	30	......	......	......	......	492.4	14.	378.4	"	12.5	.9	......	......	"	.5
702		" 11,	35	......	......	......	......	686.8	28.	658.8	brown	75.	1.6	......	......	.001	.5
703		" 10,	30	......	......	......	......	486.8	21.2	465.6	"	1.8	4.7	......	......	none	.05
744		" 20,	35 school house		......	......	......	544.4	30.	514.4	gray	15.	2.5	.04	.092	"	1.
780		" 28,	35	......	......	......	......	586.	46.	540.	white	24.	.7	......	......	.001	21.
781		" 28,	31	......	......	......	......	778.	72.	706	"	56.5	1.2	......	......	none	9.
782		" 28,	31	......	......	......	......	629.2	44.8	584.4	"	28.	1.2	......	......	"	7.
783		" 28,	32	......	......	......	......	853.6	64.8	788.8	brown	83.	3.5	.001	.098	.03	12.
784		" 28,	90	......	......	......	......	1233.6	26.8	1206.8	"	.5	7.05	3.375	.206	none	.06
785		" 28,	51	......	......	......	......	800.	62.4	737.6	white	14.5	1.5	none	.06	"	.85
876		May 21,	26	......	......	......	......	414.8	36.	378.8	"	4.6	1.	.082	......	.003	.5
877		" 21,	50	......	......	......	......	902.	94.	808.	"	31.	1.1	......	......	.015	6.5
878		" 21,	31	......	......	......	......	686.8	46.	640.8	"	8.	.4	.001	.036	none	.8
879		" 21,	30	......	......	......	......	736.	60.	676.	"	34.	1.45	......	......	"	2.2
880		" 21,	23	......	......	......	......	756.	76.	680.	"	33.	1.2	......	......	.008	16.
881		" 21,	30	......	......	......	......	370.8	32.	338.8	brown	6.2	2.5	.822	.114	none	.1
913		" 28,	40	none	none	.01	none	846.8	88.	758.8	white	130.	.8	none	.06	"	9.6
914		" 28,	35	decid.	much	.2	"	773.6	36.	737.6	red	100.	1.7	.576	.08	"	1.
915		" 28,	27	none	little	.02	musty	708.4	68.4	640.	white	54.	1.5	.006	.088	"	12.
916		" 28,	35	decid.	"	.3	none	1312.	44.8	1267.2	brown	1.4	5.5	3.76	.19	"	.13
917		" 28,	25	none	"	none	musty	1012.	92.	920.	white	64.	1.	.002	.074	"	32.
918		" 28,	28	"	"	.01	none	924.8	83.2	841.6	"	20.	1.1	.002	.074	.001	13.
941		June 5,	30	decid.	"	.06	musty	557.6	112.	445.6	"	1.6	.8	.218	.05	none	.2
942		" 5,	35*b*	slight	"	none	none	404.	48.	356.	"	9.	1.	none	.044	"	5.5
943		" 5,	29	none	none	"	"	526.8	61.6	465.2	"	27.	.9	.016	.064	.006	1.8
944		" 5,	26	"	"	"	"	732.	74.8	657.2	"	23.	1.6	.004	.07	none	12.
945		" 5,	36	slight	"	"	"	732.	44.	688.	"	60.	1.3	.004	.066	"	20.

*The samples of water from Wyoming were sent to us by various citizens who suspected that their wells might be contaminated.

*Blank spaces in these tables are due to the loss of parts of the records by fire and our failure to obtain the reports from the persons to whom they had been sent.

UNSANITARY CONDITION OF WELL WATERS.

Although the number of samples of water which were analyzed at the direct request of private citizens, health commissioners, or other town officers, to December 31, 1896, is eight hundred and two, yet we have presented in the foregoing tables the data relating to but six hundred and seventy of these, because our records of the analyses of the other one hundred and thirty-two samples are in most cases very incomplete and in the other cases have been lost entirely, in consequence of the fire.

In the following table these waters are classified with reference to the nature of the sources from which they were derived. In column I, there appear only such samples as are included in the preceding tables. In column II, appear those samples of which the records have been lost or are very incomplete. Column III. shows the total number of analyses of samples derived from each sort of source.

Sources of the waters which were analyzed at the request of private citizens or health officers.	I Number of samples. recorded.	II Records lost.	III Total number analyzed.
Surface waters, from rivers mainly, but also from lakes	51	18	69
Well waters from rock strata; artesian, etc	94	37	131
Springs	9	7	16
Cisterns	8	4	12
Ice	1	3	4
Distilled waters	2	1	3
Waters from drift strata, deep wells	55	12	67
Waters from drift strata, ordinary shallow wells	450	50	500
Total	670	132	802

Accompanying most of the samples of water from ordinary shallow wells, there came to us the statement either that cases of typhoid fever or diphtheria existed in the families which used the water, or that these diseases were prevalent in the neighborhood.

Prom careful consideration of the analytical data, the character and depth of the wells, and the nature of the surroundings, we were led, in by far the greater number of cases, to the conclusion that the wells in question receive drainage from refuse animal matters.

In these cases, consequently, we made recommendations either that the use of the water for drink should be discontinued, or that the water should be drank only after it had been thoroughly boiled.

From some of the localities represented, we received also a few samples of waters from shallow wells so situated as to lead us to the belief that they were uncontaminated.

The study of the analyses of these presumably uncontaminated waters, and of the analyses included in the tables upon pages 56 to 69, the latter representing waters from wells concerning which we have personal knowledge, resulted in our adoption of the ' standards" which are recorded upon page 24.

The maximum limits of content of impurities there stated, we believe to be very liberal, especially those for "chlorine" (in chlorides) and "nitrogen as nitrates," but they have been adopted only provisionally and pending the more extensive and thorough investigation of the ground water supplies of the State.

On comparing the results recorded in the preceding tables with these standards, we find that of the 450 samples of water from ordinary shallow wells, 168 samples contained "chlorine" and "nitrogen as nitrates," each in excess of 15 parts per million, and that of the rest, 158 samples contained more than 15 parts per million of chlorine together with quantities of nitrates which in many cases closely approximated the maximum limit.

The facts relating to chlorine and nitrates are exhibited in the following table:

Classification of well waters with reference to content of "Chlorine" and "Nitrogen as Nitrates."	Number of wells.	Percentage of all shallow wells.	Chlorine in Chlorides.			Nitrogen as Nitrates.		
			Highest.	Lowest.	Average.	Highest.	Lowest.	Average.
Chlorine and nitrogen, each more than 15.	168.	37.33	1250.	20.	114.3	110.	16.	33.1
Chlorine more than 15, nitrogen 15 or less	158.	35.11	1000.	16.	65 8	14.5	.1	8.63
Chlorine 15 or less......	124.	27.56	15.	.5	9.5	8.6	none	2.18
Averages and limits for entire series	450.	10J.	1250.	.5	68.4	110.	"	16.18

The precise relation between the content of nitrates and the dissemination of disease by use of the water in which they are contained, is not definitely known, although Mallet and others long ago called attention to the fact that nitrates were abundant in waters which were known to be in unsanitary condition, *i.e.*, to have caused disease. Various limits for content of nitrates have been decided upon by boards of health and writers upon sanitary matters, but the fertile drift soils of Illinois are naturally highly nitrogenous, and it is probable that for this region, the quantities of nitrates normally contained in unpolluted ground waters may range much higher than elsewhere. In a number of instances, we have found great quantities of nitrates in waters used by families in which several deaths from typhoid fever occurred, and we have found that the well waters in every fever-scourged district from which we have received samples, are charged with such quantities of nitrates as must on any reasonable basis be considered excessive. If judged by the Maryland limit of .5 part, the Iowa limit of 1. part or the Michigan limit of .9 part, almost all of the shallow well waters which we have examined would be condemned as polluted.

With regard to the other nitrogenous constituents of shallow well waters, although we have not presented the data in especially tabulated form, it may be stated that at certain seasons nitrites are quite generally present in notable quantity, but that the quantities of free ammonia and albuminoid ammonia are usually such as come far within the limits which have been adopted for these states.

NORMAL GROUND WATERS.

More than half of the people of the State of Illinois depend upon wells for their water supply. Although a portion of this supply is derived from rock strata, yet by far the greater part is drawn from the deposits which overlie the rock, which deposits, with the exception of one small area in the extreme southern end of the State, consist of glacial detritus.

SPRING WATERS, present most varied characteristics-depending upon the nature of the outcrop upon which the waters are originally gathered and the strata with which they come in contact on their way to the point at which they issue from the earth.

According to their sources and their characteristics they resemble either surface waters, or one or another of the groups of well waters, and they will not at present be considered separately.

ARTESIAN WELLS.

Waters obtained from the deeper lying rock strata are as a rule entirely free of impurities derived from the products and the wastes of habitation. They contain various substances leached from the rock strata and frequently are heavily charged with common salt. Many of them produce medicinal effects upon the system and must be classed with mineral waters rather than with potable waters. Deep rock wells are commonly called artesian wells by the public though the term "artesian" applies, properly, only to the flowing well.

We have made the sanitary analysis of waters from a considerable number of wells which draw their supply from the rock strata, but the complete quantitative analysis of the mineral matters, which for waters of this class is of great importance, we have, except in a few instances, hitherto been obliged to omit.

WATER FROM THE DRIFT.

Nearly the whole surface of our state is covered with deposits of glacial detritus, the drift and the loess, to depths of from ten to one hundred and fifty feet, in some parts even to a depth of two hundred and fifty feet or more. These deposits include strata of sand, gravel, and clay, in almost infinite variety of character, fineness, and states of admixture with each other, and range from pure, clean rock fragments, silica, etc., and pure kaolin, on the one hand, to indeterminate mixtures containing large proportions of organic matters, the remains of vegetable life, on the other.

Throughout large areas of the state, ancient surface soils, peat beds, and the like, have been covered by considerable deposits of sand, gravel, clay, etc.; in many localities several such buried surface soils containing the remains of the organic matters incident to the luxuriant vegetable growths of past ages, lie one below another, separated by intervening drift deposits which range from several feet to fifty or sixty feet in thickness.

Many of the drift strata are water-bearing and a large proportion of the citizens of Illinois outside of the larger cities drink water drawn from wells which are sunk more or less deeply in the drift. These waters in normal condition present almost endless variety in minor characteristics, depending of course upon the composition of the deposits with which they have been in contact, but they fall naturally into two groups with reference to their leading qualities and the relative proportions of their several nitrogenous constituents. These two groups may be designated as shallow drift waters and deep drift waters respectively, since, in general, the differences manifested depend upon the depth from which the waters are drawn.

NORMAL SHALLOW DRIFT WATERS contain the various salts and other substances which have been leached from the upper soil, essentially in unchanged condition, ?. *e.*, they contain chlorides, sulphates, carbonates, and silicates of calcium, magnesium, potassium, and sodium, with minute quantities of iron and aluminium compounds, together with considerable quantities of nitrates, but only minute quantities of saline ammonia and albuminoids; organic matters are almost entirely absent. Nitrites are frequently present in notable quantity.

NORMAL DEEP DRIFT WATERS contain in general the same mineral salts as the shallow waters but usually the quantity of iron is considerable, and the nitrates are either entirely absent or present in but minute quantity, while free ammonia is abundant and albuminoids are present in comparatively considerable quantities.

"Oxygen consumed" is high, and the water residue blackens upon being heated, showing that much organic matter is contained.

In appearance and in palatability the two classes of waters present marked differences.

The waters from shallow wells are well aerated, and are clear, sparkling, cool, and of agreeable taste; those from the deeper wells, on the other hand, contain little or no oxygen, possess in many cases a disagreeable taste due to the presence of marsh gas, accompanied occasionally by minute quantities of sulphuretted hydrogen, and are either turbid or become turbid quickly on exposure to air, owing to the oxidation of the iron carbonate which they contain and the consequent precipitation of insoluble ferric compounds. The precipitating particles are often so minute as to be at first indistinguishable except from the color which they impart to the water, but after a short exposure to the air the water becomes opalescent, then decidedly turbid; finally a brown deposit similar to iron rust is produced, and after this has separated the water becomes clear and colorless.

Although these unpleasant characteristics of the deep drift waters give rise to much prejudice and objection to their general use for drink, nevertheless, from the sanitary standpoint, they are usually to be preferred to the clear and palatable waters of the shallow wells, since the evidence of numerous analyses shows, that they are far less subject

to pollution with refuse animal matters than are the latter, while the organic matters which they contain are derived from the buried vegetable remains referred to above, and are comparatively harmless.

INVESTIGATION OP DRIFT WATERS.

For the purpose of obtaining more definite information concerning the normal characteristics of the ground waters of the state, we have made regular periodic examinations of the water of several wells which are situated in the vicinity of the University and which we believe may be regarded as fairly representative of the ordinary wells in all parts of the state which are covered with the drift deposits.

These wells present some variety in character and depth and have permitted us to determine in some degree the effects of the varying meteoric conditions upon the character of the ground waters.

Well number 1, situated at No. 1007, West Green street, Urbana. The water from this well has been examined once a week since September, 1895. The well was dug in 1888 and is twenty feet deep; the bottom is in the hardpan, through which a number of holes were made in order to admit the water from the stratum immediately beneath. When the well was dug care was exercised to prevent any possible access of water from the surface or from the strata above the hardpan. . The upper stratum consists of a rich black loam eighteen inches deep, overlying yellow clay. Three feet below the surface there is a stratum of sand and gravel two feet in thickness with strata of clay beneath that reaching down to the hardpan; the first eighteen inches consisting of yellow clay, the rest, about fifteen feet, consisting of stiff, blue clay containing boulders. The upper permeable stratum is water-bearing at certain seasons, but any possible access of water from this stratum to the well was prevented by banking the sides with clay taken from the well itself and thoroughly worked in behind the dry brick lining. The well was clean and perfectly dry until the holes were made through the hardpan stratum in the bottom. On boring through the hardpan with an auger, water carrying a little fine white sand rushed in and quickly rose to the heighth of seven feet, at which heighth it normally stands in the well.

During a period of four months in the latter part of the series of dry years ending Christmas, 1895, analyses yield data which are not very different from the data from similar analyses made since that time, although in the latter part of December; *i.e.*. between December 17 and 30, inclusive, there were very heavy rains resulting in a total fall of 5.37 inches, and causing great variations in the waters of wells, to which water of the upper strata of the soil had access. The detailed report of the analysis of the water of this well is found on page 56.

Well number 2: Six hundred feet from well number 1 there is another well, 22 feet deep getting its water, in general, from a stratum of so called putty sand immediately underlying the hardpan, but to which the water from the overlying strata has free access since the sides of the well are bricked up dry and readily admit anything which may come to the walls of the well. The water from this well was constant in composition until the period of the heavy rains referred to above, at which time it immediately suffered great change, the quantities of the various constituents becoming almost double, particularly chlorine, nitrates, and total solids The increase took place at once and in very great amount, and, further while there has been some variation since that time, still during the year which has now elapsed, the high percentages in the proportions of these constituents has remained approximately the same, indicating thus that the well in times when the ground water is high, in other words, at times other than periods of drouth, receives a great deal of its supply from the upper strata of the immediate vicinity.

Well number 3, situated at No. 905 West Green street, Urbana, and a quarter of a mile east of number 2, is a bored well, 18 feet in depth and bricked dry. This well, although far removed from any sources of possible contamination with surface water has also experienced considerable variation in the quantities of mineral ingredients contained. Until the time of the heavy rains the character of the water

as shown by the analytical data was quite constant, but since that time and beginning with the date of the first heavy rains, the water has shown quite wide fluctuations.

Well number 4 is an ordinary twenty foot dug well cased with brick dry. It is situated about midway between number 1 and number 2 and there is no source of possible contamination within 300 feet.

Well number 5, at No. 510 John street, Champaign, is about one-fourth mile west of well number 2. The well is thirty-five feet deep, bored, and lined with tile.

Well number 6, at No. — South Matthews avenue, one-third mile south of well number 1, is a driven well, 153 feet in depth, cased with iron pipe. No possible source of contamination exists nearer than one-fourth mile.

Series number 7 comprise the results of analyses of water from the wells of the Urbana and Champaign water works as it flows from the tap in the chemical laboratory of the University. The several adjacent wells which are in use are from 157 to 165 feet deep, cased with iron pipe, and draw water from an extensive deposit of quicksand. In sinking the wells a stratum of black peat was found at the depth of eighty feet and it is doubtless from this source that the considerable quantities of organic matters including albuminoids, and the large quantity of free ammonia are derived.

The wells number 6 and 7 are typical of the deep wells which draw water from the drift, and the results of the analyses show that the waters from these sources are remarkably free of variations, especially those which in other wells may be ascribed to meteoric conditions and the presence of refuse animal matters at or near the surface.

WELL NUMBER 1.

Chemical examination of the water of a twenty foot well. (Parts per 1,000,000.)

Number.	Date of Collection.	Appearance: Turbidity.	Appearance: Sediment.	Appearance: Color.	Odor.	Residue on Evaporation: Total.	Residue on Evaporation: Loss on Ignition.	Residue on Evaporation: Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.	Rainfall in inches for the period ending
1	Sept. 13,'95	none	little	none	none	397.6	110.	287.8	white	12.	.4	.01	.02	trace	.35	3.01
22	" 26,	"	none	"	"	366.8	26.4	340.4	"	11.	.25	.01	.028	none	......	1.6
38	Oct 2,	"	"	"	"	365.6	42	323.6	"	11.	1.	.01	.016	"	.4	.52
139	Nov. 4,	"	"	"	"	355.2	4 2	351.	"	lost	lost	lost	lost	lost	lost	.16
165	" 7,	"	"	"	"	360.4	23.	337.4	"	"	"	"	"	"	"	......
171	" 8,	"	"	"	"	355.2	14.	341.2	"	"	"	"	"	"	"	.35
178	" 11,	"	"	"	"	357.6	7.6	350.	"	"	"	"	"	"	"	.99
212	" 21,	"	"	"	"	354.	8.	346.	"	"	"	"	"	"	"	.17
232	Dec. 2,	"	"	"	"	379.2	12.8	366.4	"	"	"	"	"	"	"	1.73
274	" 17,	"	"	"	"	360.	18.4	341.6	"	"	"	"	"	"	"	.16
283	" 19,	"	"	"	"	352 8	14.	338.8	"	"	"	"	"	"	"	2.58
288	" 20,	"	"	"	"	364.	20.4	343.6	"	"	"	"	"	"	"	1.32
296	" 21,	"	"	"	"	356.4	21.2	335.2	"	"	"	"	"	"	"	.18
299	" 22,	"	"	"	"	341.6	15.2	326.4	"	"	"	"	"	"	"	......
302	" 23,	"	"	"	"	330.8	16.	314 8	"	"	"	"	"	none	"	......
308	" 24,	"	"	"	"	327.6	16 4	311 2	"	10	.4	"	"	"	1.6	.27
312	" 25,	"	"	"	"	327.6	19.2	308.4	"	10.	.5	"	"	"	1.6	.58
317	" 26,	"	"	"	"	330.8	16.8	314.	"	10.5	.7	"	"	"	1.8	.02
326	" 28,	"	"	"	"	329.2	11.2	318.	"	10.5	1.	"	"	"	1.	......
336	" 30,	"	"	"	"	320.8	6.4	314.4	"	12.	6	"	"	"	2.3	......
347	Jan. 2,'96	"	"	"	"	333.6	10 4	323.2	"	11.	.6	"	"	"	2.2	.42
352	" 6,	"	"	"	"	335	34.4	300.6	"	11.	.6	"	"	"	1.8	.01
368	" 10,	"	"	"	"	332.8	22.	310.8	"	10.	.6	"	"	"	1.75	......
393	" 16,	"	"	"	"	341.6	18.8	322.8	"	11.	1.1	"	"	"	2.	......
415	" 23,	"	"	"	"	343 2	18.4	324.8	"	10.5	.7	"	"	"	1.	.23
438	" 30,	"	"	"	"	351 2	29.2	322.	"	11.	.6	"	"	"	1 6	.53
461	Feb. 5,	"	"	"	"	352.4	18.	334.4	"	10.5	.4	"	"	"	.8	1.09
484	" 13,	"	"	"	"	353.2	19.2	334.	"	10.	.65	"	"	"	.55	.53
502	" 20,	"	"	"	"	361.2	9.2	352.	"	11.	.4	"	"	"	.775	.35
522	" 27,	"	"	"	"	364.8	14 4	350.4	"	12.	.55	"	"	"	.3	.2
534	Mar. 3,	"	"	.	"	363.2	10.4	352.8	"	11.	.65	"	"	"	.7	.16
549	" 9,	"	"	"	"	364.	17.2	346.8	"	11.	.6	"	"	"	.55	.44
577	" 16,	"	"	"	"	354.	13 2	340.8	"	11.	.4	"	"	"	.65	.19
604	" 23,	"	"	"	"	360.4	12.8	347.6	"	11.	.6	"	"	"	.75	.29
638	" 30,	"	"	"	"	358.	15.2	342 8	"	12.	.7	"	"	"	.3	.3
[illegible]	Apr. 6,'96	none	none	none	none	[illegible]	16.8	[illegible]	white	10.5	.2	lost	lost	none	.3	......
[illegible]	" 13,	"	"	"	"	362.	17.6	344.4	"	11.	.9	"	"	"	.136	.71
[illegible]	" 20,	"	"	"	"	369.2	21.2	348.	"	11.	.65	"	"	"	.03	.36
758	" 27,	"	"	"	"	368.	14.	354.	"	11.	.7	"	"	"	.25	.42
791	May 4,	"	"	"	"	365.6	9.2	356.4	"	12.	.9	"	"	"	.15	1.52
819	" 11,	"	"	"	"	370.	16.	354.	"	11.	1.1	"	"	"	.15	.31
849	" 18,	"	"	"	"	380.	34.	346.	"	12.	.3	"	"	"	.25	1.01
885	" 25,	"	"	"	"	369.2	30.	339.2	"	12.5	.7	none	.036	"	.95	2.64
922	June 1,	slight	little	.02	"	362.	20.	342.	"	12.	.7	"	.054	"	.95	.58
951	" 8,	none	"	.03	"	376.	30.	346.	"	11.	1.3	"	.014	"	.75	......
976	" 15,	slight	"	.02	"	372.	22.	350.	"	11.	1.	"	.022	"	1.	2.09
1010	" 22,	"	"	.02	"	376.4	34.	342.4	"	13.	1.3	.004	.022	"	.8	.64
1044	" 29,	"	"	.02	"	375.2	21.2	354.	"	13.	1.4	.002	.018	"	.73	.25
1070	July 6,	"	"	.02	"	368.	24.	344.	"	13.	.7	.007	.02	"	.6	1.2
1098	" 13,	"	"	.02	"	390.	34.	356.	"	13.	1.4	none	.026	"	1.	......
1132	" 20,	none	v. little	.02	"	414.	42.	372.	"	13.	1.3	.003	.04	"	.55	2.57
1175	" 27,	v. slight	"	.02	"	390.4	34.	356.4	"	14.	.8	.002	.034	"	1.1	3.16
1207	Aug. 3,	"	"	.02	"	376.	28.4	347.6	"	13.	1.	none	.024	"	1.9	1.96
1242	" 12,	"	"	.02	"	386.	30.	356.	"	13.	1.3	"	.036	"	1.5	.33
1307	" 24,	"	"	.02	"	344.8	30.	314.8	"	13.	1.2	"	.027	"	1.7	2.43
1326	" 31,	"	"	.03	"	381 6	32.	349.6	"	12.	1.6	"	.024	"	1.8	......
1346	Sept. 7,	"	"	.02	"	363.6	34.	329.6	"	13.	1.3	"	.032	"	2.2	2.65
1368	" 14,	"	"	.02	"	393.6	44.	349 6	"	13.	1.2	"	.058	"	1.75	......
1389	" 21,	"	"	.03	"	365.2	10.4	354.8	"	13.	1.2	"	.038	"	1.8	.9
1413	" 28,	"	"	.02	"	369.6	12.	357.6	"	12.	1.5	.001	.024	"	.9	.09
1436	Oct. 5,	"	"	.02	"	364.	22.	342.	"	13.	1.2	none	.015	"	1.2	......
1485	" 12,	"	"	.02	"	363.4	14.4	348.	"	13.	1.2	.002	.026	"	1.08	.4
1517	" 19,	"	"	.02	"	357 2	16.	341.2	"	12.5	1.1	.001	.028	"	.92	......
1548	" 26,	"	"	.03	"	367.2	20.4	346.8	"	12.	1.4	.003	.022	"	.76	......
1576	Nov. 2,	"	"	.02	"	370.	36.	334.	"	12.	1.1	none	.0·8	.001	.68	.03
1601	" 9,	"	"	.02	"	360.	20.	340.	"	12.	1.	"	.04	none	.76	1.63
1629	" 16,	"	"	.02	"	356.	42.	314.	"	12.	1.4	"	.026	"	.8	.22
1653	" 23,	"	"	.02	"	355.2	19.2	336.	"	12.	1.1	.001	.036	"	.88	.22
1673	" 30,	"	"	.02	"	356.	10.	346.	"	12.	.9	.002	.022	"	.8	.61
1696	Dec. 7,	"	"	.02	"	360.	13.2	346.8	"	12.	.8	none	.026	"	1.5	......
1718	" 14,	"	"	.03	"	358.8	14.	344.8	"	12.	1.2	"	.026	"	.64	.23
1749	" 21,	"	"	.04	"	355.2	30.	325.2	"	11.	1.	.001	.02	"	.7	......
1768	" 28,	"	"	.02	"	361.6	16.4	345.2	"	12.5	1.4	none	.02	"	.7	......

AVERAGES.

Average	.0217	....	360.6	21.9	338.7	....	11.7	.893	.0018	.0285	none	.923	......
Highest	.04	....	414.	44.	372.	....	14.	1.6	.01	.058	001	2.2	......
Lowest	.02	....	320.8	4.2	287.6	....	10.	.2	none	.014	none	.15	......

Unfortunately the results of some of our earlier analyses were lost, but our inspection of the data before the time of the fire had already revealed the fact that the heavy rainfall of the Christmas season of 1895 resulted in very slight variation in the amounts of the various constituents of the water of this well in comparison with the variations which occur in well waters derived wholly or in part from strata above the hard pan. See analyses of water from well number 2.

WELL NUMBER 2.

Chemical examination of the water of an ordinary twenty-two foot well. (Parts per 1,000,000.)

Number.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as				Rainfall in inches for the week ending
		Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.				Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	
3	Sept. 13,'95	......	......	......	......	445.6	113.6	332.	white	13.5	.75	.015	.052	.001	......	3 01
25	" 26,	......	......	......	......	466.6	73.4	393.2	"	13.5	1.	.012	.056	......	7.98	1.6
35	Oct. 2,	......	......	......	......	450.4	73.	377 4	"	13.	1.5	.004	.044	......	11.99	.52
58	" 9,	......	......	......	......	436.2	64.2	372.	"	12.	1.4	.002	.032	none	12.99	.11
80	" 17,	......	......	......	......	430.8	37.8	393.	"	13.5	1.8	.006	.04	......	10.99	.06
100	" 23,	......	......	......	......	442.	44.4	397.6	"	14.5	1.45	.012	.076	......	10.98	......
127	" 30.	......	......	......	......	440.6	45.	395.6	"	14.5	1 65	.002	.054	.001	9.49	......
166	Nov. 7,	......	......	......	......	440.4	78.	362.4	"	15.	1.35	.003	.178	.001	6.97	......
169	" 8,	......	......	......	......	444.2	61.8	382.4	"	14.	1.4	.008	.136	.001	6.492	.35
180	" 11,	......	......	......	......	438.4	44.6	393.8	"	14.	1.35	.002	072	.001	11.99	.99
192	" 14,	......	......	.04	......	445.6	46.	399.6	"	14.	.95	.008	.09	.001	13.99	......
175	" 9.	......	little	......	......	431.4	32.6	398.8	"	14.	2.1	.018	.132	.001	7.982	......
213	" 21,	......	"	.03	......	448.	53.4	394.6	"	13.	1.4	.022	.076	.005	11.97	.17
217	" 25,	......	......	.01	......	442 2	31.	411.2	"	13.	1.3	.001	.078	.003	11.99	.15
218	" 26,	......	......	.02	......	444 8	25.4	419.4	"	12.5	1.55	.005	.031	.001	10.99	.09
231	Dec. 2,	......	little	.02	......	463.2	19.4	443.8	"	14.	2.65	.002	.094	.001	12.99	1.51
272	" 17,	slight	none	.02	none	494.	50.8	443.2	"	14.	3.6	.011	.098	.013	13.98	.16
282	" 19,	"	"	.03	"	638.	61.6	576.4	"	18.	2.65	.002	.104	.013	16.99	2.58
289	" 20,	none	"	.01	"	732.	56.	676.	"	21.	2.4	.018	.096	.012	17.98	1.32
297	" 21,	"	little	01	"	750.8	48.	702.8	"	22.	1.85	.004	.086	.012	14.99	.18
300	" 22,	"	none	.02	"	767.2	46.8	720.4	"	21.	2.3	.006	.122	.011	16,99	......
304	" 23,	"	"	01	"	744.	52.	692.	"	21.	1.8	.006	.098	.008	15.99	......
309	" 24,	slight	little	.02	"	740.	78.	662.	"	19.5	2.2	.018	.108	.007	15.98	.27
314	" 25,	none	none	.02	"	736 4	40.	696.4	"	19.	1.7	.015	.118	.005	17.98	.58
316	" 26,	slight	little	.01	"	730.	43.2	686.8	"	19.	2.6	.001	.08	.004	19.89	.02
325	" 28,	none	none	.01	"	722.8	46.8	676.	"	18.5	1.35	.001	.058	.004	22.	......
337	" 30.	"	"	.01	"	688.8	72.	616.8	"	19.	1.2	007	.05	.003	22.	......
348	Jan. 2,'96	"	"	.01	"	676.8	72.9	597.6	"	18.	1.5	.002	.028	.001	26.	.42
351	" 6,	"	little	.02	"	672.	44.	628.	"	17.	1.15	none	.044	.002	20.	.04
369	" 10,	"	none	.01	"	612.4	22.	590.4	"	16.5	1.7	.001	.1	.003	24.	......
396	" 16,	"	little	.02	"	608.	48.	560.	"	17 5	2.1	none	.06	.001	22.	......
414	" 23,	"	"	.02	"	566.8	36.8	530.	"	16.5	1.6	.002	.102	.001	20.	.23
439	" 30,	"	"	.02	"	567.2	41.2	526.	"	16.	1.8	.004	.052	.001	24.	.53
457	Feb. 5,'96	none	none	.02	none	580.	40.	540.	white	18.	1.6	.007	.066	none	20.	1.09
485	" 13,	"	"	.01	"	602.8	60.	596.8	"	17.	1.3	none	.032	.001	25.	.53
500	" 21,	"	little	.03	"	618.	38.	610.	"	18.	1.7	.001	.044	.002	20.	.35
521	" 27,	"	none	.02	w'l'd ch'y	656.8	60.	596.8	"	18.5	1.35	.002	.04	.001	18.	.2
533	Mar. 3,	"	little	.02	"	633.2	27.2	606.	"	18.	1.4	.017	.056	.001	26.	.16
548	" 9,	"	"	.02	"	634.4	40.8	593.6	"	18.	1.4	none	.04	.001	19.	.44
578	" 16,	"	"	.02	"	610.	48.	562.	"	17.5	1.25	.014	.062	.002	20.	.19
602	" 23,	......	......	......	......	590.4	48.	542.4	"	19.	1.4	......	......	.001	22.	.29
640	" 30,	"	none	.02	none	588.4	45.6	542.8	"	17.	1.5	.003	.034	.001	25.	.3
670	Apr. 6,	"	little	.02	w'l'd ch'y	581.6	48.8	532.8	"	17.	.8	none	.019	none	17.5	......
697	" 13,	slight	none	.02	"	602.	52.	550.	"	17.	1.9	.007	.036	"	24.	.71
763	" 27,	none	little	.02	"	586.8	44.	542.8	"	16.5	1.75	.006	.09	"	18.	.78
793	May 4,	"	"	02	"	602.	60.	542.	"	15.	1.55	none	.034	.001	18.	1.52
820	" 11,	"	"	.02	"	604.8	68.	536.8	"	16.5	1.8	.001	.034	.001	19.	.31
848	" 18,	"	"	.03	none	598.8	73.6	525.2	"	15.	1.2	.001	.03	.001	17.5	1.01
884	" 25,	"	"	.02	w'l'd ch'y	704.	91.2	612.8	"	17.5	1.5	none	.062	.001	17.5	2.64
921	June 1,	"	"	.03	"	668.	52.	616.	"	18.	1.7	"	.09	.008	25.	.58
950	" 8,	"	"	.03	"	636.	76.	560.	"	17.	1.9	"	.034	.004	19.	......
975	" 15,	slight	little	.02	"	656.	80.	576.	"	17.	1.9	"	.052	.003	22.	2 09
1008	" 22,	"	"	.02	"	630.	60.	570.	"	17.	1.9	"	.022	.001	17.	.64
1042	" 29,	"	"	.02	"	618.4	82.4	536.	"	18.	1 8	.004	.062	none	19.	.25
1067	July 6,	"	"	.03	"	602.	62.	540.	"	17.	1.9	.001	.04	.001	16.	1.2
1096	" 13,	"	"	.02	"	592.8	76.	516.8	"	16.	1.8	none	.04	none	17.6	......
1131	" 20,	"	"	.03	"	618.	78.	540.	"	16.	2.5	.001	.04	.001	18.4	2.57
1174	" 27,	"	"	.03	"	701.6	79.8	681.8	"	19.	2.4	.001	.068	.001	24.	3.16
12 6	Aug. 3,	"	"	.03	none	753.6	80.	673.6	"	20.	2.5	.001	.05	none	19.	1.96
1241	" 10,	"	"	.02	"	738.	28.	710.	"	20.	2.3	.002	.062	.001	19.2	.33
1306	" 24,	"	"	.03	"	752.	68.	684.	"	22.	1.6	.001	.052	.001	20.	2.45
1325	" 31,	"	"	.02	"	704.8	52.	652.8	"	20.	1.6	.002	.046	none	19.	......
1345	Sept. 7,	"	"	.02	"	719.6	70.8	648.8	"	19.	1.9	none	.05	"	21.6	2.65
1367	" 14,	"	"	.02	"	726.8	90.	636.8	"	19.	1.9	"	.048	.001	22.	....
1388	" 21,	"	"	.02	"	645.6	22.	623.6	"	19.	1.4	"	.058	none	22.	.9
1412	" 28,	"	"	.03	"	630.4	60.	570.4	"	17.5	2.	"	.062	"	25.	.09
1435	Oct. 5,	"	"	02	"	667.2	80.	587.2	"	18.	1.8	.001	.023	"	20.	......
1484	" 12,	"	"	.02	"	679.2	41.2	636.	"	20.	1.4	none	.026	"	21.6	.4
1516	" 19,	"	"	.03	"	650.	66.	584.	"	20.	1.8	"	.046	"	20.8	......
1547	" 26,	"	"	.03	"	670.8	57.2	613.6	"	42.	1.9	.001	.026	.001	20.8	......
1575	Nov. 2,	decided	cons'd	.04	"	666.8	78.	588.8	"	31.	3.	.011	.088	.001	19.4	.03
1600	" 9,	slight	little	.02	"	632.	34.	598.	"	24.	1.9	.001	.052	.001	17.6	1.63
1628	" 16,	"	"	.03	"	657.6	64.	593.6	"	21.	1.5	.001	.04	none	20.	.22
1652	" 23,	"	"	.03	"	733.6	63.6	670.	"	19.	1.5	002	.046	.001	19.2	.22
1672	" 30,	"	"	.02	"	625.6	68.8	556.8	"	19.	1.5	.001	.051	.001	20.	.61
1695	Dec, 7,	"	"	.02	"	648.	60.	588.	"	18.	1.7	.003	.032	none	25.	......
1717	" 14,	"	"	.04	"	636.4	98.	538.4	"	17.	1.5	.01	.058	.001	22.4	.23
1748	" 21,	"	"	.03	"	623.2	58.	565.2	"	18.	1.7	.001	.038	none	22.	......
1767	" 28,	"	"	.04	"	618.	40.	578.	"	16.	1.5	.001	.028	"	19 2	......

WELL NO. 2.—*Continued.*

(Parts per 1,000,000.)

	Residue on Evaporation.			Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as				Rainfall in inches for the week ending.
	Total.	Loss on Ignition.	Fixed.				Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	
AVERAGES FOR PERIOD SEPTEMBER 13, 1895, TO DECEMBER 17, 1895, INCLUSIVE.											
Average	447.3	52.6	394.7	....	13.6	1.6	.009	.079	.0017	10.89	......
Highest	494.	113.6	443.8	....	15.	3 6	.03	.178	.013	13.99	......
Lowest	430.8	19 4	332.	....	12.	.75	.001	.031	none	6 49	......
AVERAGES FOR PERIOD FROM DECEMBER 19, 1895, TO DECEMBER 28, 1896, INCLUSIVE.											
Average	658.1	58.1	600.	....	18.8	1.75	.003	.056	.002	20.26	......
Highest	767 2	98.	720.4	....	42.	3.	.018	.122	.013	26.	......
Lowest	566.8	22.	516 8	....	15.	.8	none	.022	none	14.99	......

During the week ending December 22, 1895, there occurred a heavy fall of rain amounting to 4.08 inches. The water in the well immediately suffered a very considerable increase in all inorganic constituents, and the higher proportions of these were maintained throughout the following year. The averages for the three months, September 13, 1895, to December 17, 1895, were essentially identical with results of analyses made during preceding years, which results however were lost by fire.

Complete quantitative analyses of the mineral matters contained in the water of this well were made in the autumn of 1895, before the time of the heavy rains and the changes occasioned by them, and again after the changes had occurred. The results of these analyses showed that the increased amount of mineral matters contained, was mainly due to the presence of greater quantities of nitrates, chlorides, and especially sulphates of magnesium and calcium. The precise data can not be given because of loss of records.

WELL NUMUKR 4.

Chemical examination of water from an ordinary well twenty feet deep. (Parts per 1,000,000.)

Number.	Date of Collection.	Appearance.			Odor.	Residue on Evaporation.			Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as				Rainfall in inches for the period ending
		Turbidity.	Sediment.	Color.		Total.	Loss on Ignition.	Fixed.				Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	
12	Sept. 18,'95	....	....	....	*	324.4	103.	221.4	white	9.	.7	.004	.042	.042	3.	.....
303	Dec. 23,	....	....	....	....	363.6	24.4	339.2	"			*	....	none	5.48	8.5
310	" 24,	....	....	....	....	359.2	29.6	329.6	"	....	....					
313	" 25,	....	....	....	....	352.	27.6	324.4	"	11.5	1.25	....	....	.007	4.	.27
315	" 26,	....	....	....	....	350 4	29.2	321.2	"	11.5	.95	....	....	none	3.5	.58
										16.	.75	....	....	"	4.5	.02
421	Jan. 25,'96	....	....	....	....	341.2	15.2	326.	white	11.5	.8	....	....	"	6.4	1.21
509	Feb. 22,	....	....	....	....	308.4	16.	292.4	"	12.	.9	....	....	.001	12.5	1.98
755	April 24,	....	....	....	....	327.6	39.6	288.	"	11.	1.1	....	....	.001	10.5	3.07
889	May 26,	....	....	....	....	355.6	35.6	320.	"	11.5	1.	.002	.054	.002	10.	5.48
981	June 16,	slight	little	.02	none	364.	40.	324.	"	13.	1.5	.004	.03	.005	11.	2 67
1088	July 10,	"	"	.02	"	370.	50.	320.	"	13.	1.3	.002	.038	.003	10.5	2 09
1212	Aug. 3,	"	"	.02	"	416.	42.	374.	"	16.	.8	.001	.044	.001	9.	7.66
1331	" 31,	"	"	.02	"	415.6	16.	399.6	"	18.	1.2	none	.038	.002	9.	2 78
1418	Sept. 28,	"	"	.02	"	431.6	28.	403.6	"	22.	1.4	"	.022	.009	11.	3.64
1553	Oct. 26,	"	"	.02	"	430.8	34.	396.8	"	22.	1.4	"	.036	.007	10.5	.4
1657	Nov. 23,	"	"	.02	"	450.	14.	436.	"	25.	2.8	.04	.082	.005	13.5	2.1
1753	Dec. 21,	"	"	.03	"	449.2	38.	411.2	"	27.	1.8	.006	.024	.005	11.	1.
AVERAGES.																
Average						377.	34.2	342.8	....	15.6	1.23	.006	.041	.005	8.55	.....
Highest						450.	103.	436.	....	27.	2.8	.04	.082	.042	13.5	.....
Lowest						308.4	14.	221.4	....	9.	.7	none	.022	none	3.	.....

*Blank spaces in this table are due to the loss of our records by fire.

WELL NUMBER 3.

Chemical examination of water from an 18-foot bored well. (Farts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Sediment.	Color.	Odor.	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia	Albuminoid Ammonia.	Nitrites.	Nitrates.	Rainfall in inches for the week ending
26	Sept. 26,'95	....	....	....	none	201.2	20 8	180.4	brown	14.	.5	.008	.026	....	2.39	......
:7	Oct. 2,	....	....	....	"	187.2	24.4	162.8	white	14.	1.2	.024	.074	....	2.176	.52
57	" 9,	....	....	....	"	183.6	32.4	151.2	"	14.5	1.2	.004	.026	....	2.39	.1
79	" 17,	....	....	....	"	178.2	6.	172.2	"	14.	1.2	.004	.032	....	1 39	.06
99	" 23,	....	....	....	"	198.2	17.4	180.8	"	14.	1.4	.004	.04	....	1.99	......
126	" 29,	....	....	....	"	206.	15 6	190.4	"	14.	.85	.002	.086	....	1.89	......
164	Nov. 7,	slight	slight	....	"	226.2	22.4	203.8	"	14.	.7	.02	.09	.001	1.68	......
170	" 8,	"	"	....	"	226.	11.6	214.4	"	12.	.85	.108	.108	.001	.592	.32
195	" 14,	"	little	....	"	219.8	12.8	207.	"	12.	.9	.026	.058	....	2.074	.99
209	" 21,	"	"	.02	"	217.4	16.6	200.8	"	13.	1.	.004	.06	....	3.496	.17
230	Dec. 2,	"	"	....	"	213.4	10.4	203.	"	12.	1.45	.004	.058	....	1.89	1.73
270	" 17,	"	"	.01	"	208.4	16.4	192.	"	12.5	1.3	.003	.042	none	4.49	.16
284	" 19,	"	"	01	"	195.2	20.8	174.4	"	15.	1.3	.01	.066	"	5.49	2.58
287	" 20,	"	none	.01	"	195.6	21.6	174.	"	18.	1.3	.001	.044	"	5.49	1.32
295	" 21,	"	little	.02	"	196.	18.	178.	"	18.	1.	.002	.03	.001	2.24	.18
298	" 22,	"	"	01	"	198.4	22.4	176.	"	17.	.8	.008	.052	.001	1.99	......
301	" 23,	"	"	.01	"	194.	22.4	171.6	"	17.	.9	.002	.046	none	1.99	......
307	" 24,	"	"	01	"	190.	12.8	177.2	"	15.5	1.05	.001	.032	"	3.749	.27
311	" 25,	"	"	.01	"	189.6	18.4	171.2	"	15.	.8	none	.038	"	3.75	.58
318	" 26,	"	"	.02	"	182.8	13.2	169.6	"	14.4	.9	.002	.044	"	2.78	.02
327	" 28,	"	"	.01	"	176.4	6.	170.4	"	14.	1.4	.016	.072	"	4.18	......
335	" 30,	clear	clear	.01	"	165 2	17.2	148.	"	14.	.8	none	.015	"	4.	......
345	Jan. 2,'96	slight	little	.01	"	161.6	8.	153.6	white	14.	1.	.001	.022	none	2.75	.42
353	" 6,	"	"	.02	"	169.6	24.8	144 8	"	14.	1.	.008	.048	"	3.5	.04
367	" 10.	"	"	.01	"	155 2	10.	145.2	"	13.5	.8	.001	.028	"	6.	......
395	" 16,	"	"	.02	"	157.2	7.2	150.	"	15.	1.2	.012	.034	"	3.	......
417	" 23,	"	"	.01	"	161.6	7.4	154.2	"	15.	1.35	none	.035	"	2.5	.23
437	" 30,	"	"	.02	"	165.6	6.4	159.2	"	16.5	1.2	.008	.05	"	5.	.53
459	Feb. 5,	"	"	.01	"	167.2	20.	147.2	"	16.	.8	.038	.072	"	5.5	1.09
487	" 13,	"	"	.02	"	168.4	22.	146.4	"	15.5	1.	.002	.021	"	5 5	.53
501	" 20,	"	"	.02	"	173.2	16.4	156.8	"	16.	1.1	.002	.056	"	4.5	.35
520	" 26,	"	"	.02	"	161.6	14.8	146 8	"	16.5	.7	.002	.026	"	3.	.2
531	Mar. 2,	"	"	.02	"	164.8	20.	144.8	"	17.	1.05	none	024	"	4.5	.16
550	" 9,	"	"	.02	"	164.8	24.	140.8	"	17.	1.05	"	.04	"	2.25	.44
576	" 16,	"	"	.02	"	164.	21.6	142.4	"	17.	.9	"	.026	"	5.	.19
[illegible]	Mar. 23,'96	slight	little	.02	none	[illegible]	11.6	151	white	18	1	none	.03	none	6.	.20
[illegible]	" 30			.02	"	170.8	15.2	155.6	"	17.	1.1	.003	.019	"	5.4	.3
[illegible]	Apr. 6,			.02	"	161.6	18.8	142.8	"	18.	.4	none	.014	"	2.5	......
600	" 13,	"	"	.02	"	156.	18.4	137 6	"	18.	.9	"	.019	"	5.	.71
731	" 20,	"	"	.02	"	158.	22.8	135.2	"	18.	1.1	.03	.024	"	4.8	.36
760	" 27,	"	"	.02	"	156.	18.4	137 6	"	18	1.1	.004	.04	"	4.8	.42
794	May 4,	"	"	.02	"	157.2	27.5	129.7	"	17.	1.	none	.02	"	3.75	1.52
821	" 11,	"	"	.02	"	153.6	28.	125.6	"	17.	1.15	"	.032	.001	5.5	.31
851	" 18,	"	"	.03	"	157.2	28.	129.2	"	17.	.8	"	.038	none	5.5	1.01
887	" 25,	"	"	02	"	155 2	24.8	130.4	"	16.5	1.5	.002	.058	.001	3.5	2.64
923	June 1,	"	"	.03	"	137 2	14.	123.2	"	15.	1.	none	.066	.003	3.5	.58
952	" 8,	"	"	.02	"	134.4	18.4	116.	"	14.	.9	.002	.018	.004	2.5	......
977	" 15,	"	"	.04	"	130.	12.	118.	"	15.	1.3	.0 4	.034	.008	4.	2.09
1009	" 22,	"	"	....	"	132.8	20.	112.8	"	12.	1.8	004	.036	.004	3.	.64
1043	" 29,	"	"	....	"	122.	16.	106.	"	12.	1.9	.002	.04	.003	3.5	.55
1068	July 6,	lost	lost	lost	"	120.8	17.2	103.6	"	10.	.9	.003	.046	none	4.	1.2
1097	" 13,	"	"	"	"	118.	18.	100.	"	10.	1.2	none	.04	"	4.	......
1133	" 20,	"	"	"	"	124.	14.2	109.8	"	10.	1 5	.012	.048	"	3.	2.57
1176	" 27,	"	"	"	"	136	14.6	121.4	"	12.	2.	.001	068	"	2.	3.13
1208	Aug. 3,	decided	little	.04	"	140.	14.	126.	"	13.	1.6	.001	034	"	2.4	1.96
1243	" 10,	slight	"	.06	"	154	18.	136.	brown	15.	2.1	none	.038	"	2.5	.33
1308	" 24,	decided	"	.03	"	150.	16.	134.	white	13.	1.1	.003	.06	.001	3.	2.45
1327	" 31,	slight	"	.03	"	142.8	12.	130.8	"	11.	1.8	.002	.038	.001	4.5	.....
1347	Sept. 7,	"	"	.04	"	144.8	12.	132 8	"	11.	1.5	.001	.47	.001	3 6	2.65
1369	" 14,	"	"	.03	"	148.8	20.	128.8	"	10	1.1	.001	.048	.001	2.4	......
1390	" 21,	decided	"	.02	"	132.8	8.4	124.4	"	9.	1.5	none	.036	.001	3.2	.9
1414	" 28,	slight	"	.03	"	126 4	14.	112.4	"	8.	1.6	"	.034	.001	2 5	.09
1437	Oct. 5,	"	"	.03	"	132.	10.8	121.2	"	8.	1.7	.002	.03	.001	3.	.....
1486	" 12,	"	"	.02	"	136.	10.4	125.6	"	8.	1.	.003	.04	.001	3.2	.4
1518	" 19,	"	"	.03	"	112.	8.	104.	"	7.5	1.4	.004	.06	none	2.4	......
1549	" 26,	"	"	.03	"	113.2	12.	101.2	"	7.	1.2	.001	0.5	"	3 2	......
1577	Nov. 2,	"	"	.03	"	115.2	12.4	102.8	"	7.	.8	.001	.046	"	3.2	.03
1602	" 9,	"	"	.03	"	118.8	12.	106.8	"	7.	1.5	.008	.044	.001	2.8	1.63
1630	" 16,	"	"	.03	"	128.	15.2	112.8	"	7.	1.2	.002	.05	none	2.8	.22
1654	" 23,	"	"	04	"	117.6	6.8	110.8	"	7.	1.2	.002	.048	"	2.	.22
1674	" 30,	"	"	.04	"	121 2	6.	115.2	"	6.	1.6	.002	.039	.001	3.2	.61
1697	Dec. 7,	"	"	.03	"	130.8	12.	118.8	"	5.8	1.4	.002	.04	.001	3.2	......
1719	" 14,	"	"	.05	"	136.8	16.	120.8	"	6.	1.3	.003	.066	none	3.2	.23
1750	" 21,	"	"	.04	"	132.8	16.8	116.	"	6.	1.1	.001	03	.001	3.5	.16
1769	" 28,	"	"	.03	"	138.	11.2	126.8	"	5.2	2.	.003	.072	none	2.2	......

AVERAGES FOR THE PERIOD SEPTEMBER 26, 1895, TO DECEMBER 17, 1895, INCLUSIVE.

						Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia	Albuminoid Ammonia.	Nitrites.	Nitrates.	Rainfall
Average						205.5	17.2	188.2	....	13.3	1.06	.018	.059	....	2.2	......
Highest						226.2	32.4	214.4	....	14.5	1.45	.108	.108	001	4.49	......
Lowest						178.2	6.	151.2	....	12.	.5	.002	.026	.000	.59	......

AVERAGES FOR PERIOD DECEMBER 19, 1895. TO DECEMBER 28, 1896, INCLUSIVE.

						Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia	Albuminoid Ammonia.	Nitrites.	Nitrates.	Rainfall
Average						151.3	15.8	135.5	....	13.05	1.2	.0033	.041	.0007	3.6	......
Highest						198.4	28.	178.	....	18.	2.1	.038	.072	.008	6.	......
Lowest						112	6.	100.	....	5.2	.4	.0000	.038	.0000	1.99	......

WELL NUMBER 5.

Chemical examination of water from a bored well thirty-are feet deep. (Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Sediment.	Color.	Odor.	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Rainfall in inches for the week ending
529	Feb. 29, '96	distinct.	little.	....	none.	304.	5.2	298.8	brown	4.3	.5	lost	lost	none	.15	......
546	Mar. 7,	"	"	....	"	308.8	21.2	287.6	"	4.5	.6	"	"	"	.036	.56
637	" 30,	"	"	....	"	299.2	11.2	288.	"	4.7	.8	"	"	"	.044	.82
687	Apr. 9,	"	"	....	"	300.4	10.8	289 6	"	4.7	1.3	"	"	"	.07	.38
706	" 14,	"	"	....	"	300.4	8.4	292.	"	4 6	.9	"	"	"	.03	.63
751	" 22,	"	"	....	"	299.2	10.4	288.8	"	4 6	.9	"	"	"	.036	.34
759	" 27,	"	"	....	"	304.	11.6	292.4	"	4.6	1.	"	"	"	.56	.14
792	May 4,	"	"	....	"	303.6	24.	279.6	"	4.8	1.	"	"	"	.04	1.66
822	" 11,	"	"	....	"	312.	20.	292.	"	4.6	.95	"	"	"	.076	.31
850	" 18,	"	"	....	"	310.	12.	298.	"	4.7	.7	"	"	"	.046	1.01
886	" 25,	"	"	....	"	306.	8.8	297 2	"	4 7	.7	.07	.03	"	.06	2 64
924	June 1,	"	"	.8	"	298.8	10.4	288.4	"	4.8	.7	.038	.05	"	.044	.58
953	" 8,	"	"	.7	"	300.8	20.	280.8	"	5	.6	.068	.008	"	.028	.....
978	" 15,	"	"	.8	"	302.4	17.2	285.2	"	4.9	1.1	.076	.028	"	.052	2.09
1011	" 22,	"	"	.7	"	288.	22.	266.	"	4.8	1.6	.064	.02	"	.072	.64
1045	" 29,	"	"	.8	"	298.4	8.4	290.	"	4.8	2.2	.096	.04	"	.068	.25
1069	July 6,	"	"	.8	"	300.	18.	282.	"	5.5	1.	.054	.02	"	.04	1.20
1099	" 13,	"	"	.7	"	302.8	18.	284.8	"	5.3	.8	.082	.022	"	.092	.....
1134	" 20,	"	"	.7	"	328.	28	300.	"	5.1	1.1	.074	.04	"	.044	2.57
1177	" 27,	"	"	.8	"	302.	19.2	282.8	"	5.6	.7	.08	.044	"	.08	3.13
1209	Aug. 3,	"	"	.8	"	316.	32.	284.	"	5.	1.	.072	032	"	.084	1.96
1244	" 10,	"	"	.7	"	307.6	12.	305.6	"	4.6	1.5	.086	.04	"	.044	.33
1309	" 24,	"	"	.8	"	311.6	14.	297.6	"	4.8	.9	.068	.03	"	.048	2.45
1328	" 31,	"	"	.9	"	304.8	10.	294.8	"	5.1	.7	.068	.042	"	,04	.....
1348	Sept. 7,	"	"	.9	"	312.8	14.	298.8	"	4 7	.9	.044	.012	"	.06	2 65
1370	" 14,	"	"	.7	"	312.8	20.	292.8	"	4.7	1.1	.088	.038	"	.06	.....
1391	" 21,	"	"	.8	"	302.8	14.	288.8	"	4.8	1.6	.072	.034	"	.04	.90
1415	" 28,	"	"	.8	"	293.6	16.	277.6	"	5.7	.8	.058	.013	"	.048	.09
1438	Oct. 5,	"	"	.8	"	306.	16.	290.	"	4.9	1.1	.052	.034	"	.032	......
1487	" 12,	"	"	.7	"	306.8	16.	290.8	"	4.7	1.	.054	.013	"	.068	.4
1519	" 19,	"	"	.7	"	297.6	11.6	286	"	4 7	.8	.068	.018	"	.036	......
1550	" 26,	"	"	.7	"	296.	20.	276.	"	4.7	1.6	.068	.026	"	.048	......
1578	Nov. 2,	"	"	.8	"	298.	16.	282.	"	4.6	.9	.058	.032	"	.024	.03
1603	" 9,	"	"	.7	"	302.	22.	280.	"	4.7	.8	.066	.003	"	.064	1.63
1631	" 16,	"	"	.7	"	310.	22.8	287.2	"	4.8	1.3	.066	.042	"	.06	.22
1655	Nov. 23, '96	distinct	little	.7	none	307.2	11.2	296.	brown	4.7	1.	.078	.018	none	.064	.22
1675	" 30,	"	"	.7	"	382.8	20.	362.8	"	51.	1 8	.068	.036	"	.056	.61
1698	Dec. 7,	"	"	.7	"	299.6	18.8	280.8	"	4 8	2.1	.062	.074	"	.044	......
1720	" 14,	"	"	.8	"	304.	26.	278.	"	4.8	1.8	.08	.09	"	.056	.23
1751	" 21,	"	"	.8	"	299.2	20	279.2	"	4.7	1.3	.07	.032	"	.08	.18
1770	" 28,	"	"	.7	"	301.2	8.	293.2	"	4.2	1.7	.072	.016	"	.052	......

AVERAGES.

	Color.	Odor.	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Rainfall.
Average	.73	....	304 2	16.6	288.1	....	4.81	.85	.069	.032	....	.068	......
Highest	.9	....	328.	32	315.6	....	5.7	2.2	.096	.074	....	.56	......
Lowest	.7	....	288.	5 2	266.	....	4.2	5	.038	.008	....	.024	......

The abnormal results of analysis number 1675 were found to have been caused by the use of salt by the owners of the well to thaw ice which had formed in the pump. This analysis was therefor excluded in calculating the averages.

The following table represents the results of analyses of the waters from several wells which we have reason to believe are not subject to contamination of any sort. Some of them appear also in the series of tables upon pages 27—48, inclusive.

(Parts per 1,000,000.)

Number.	Date of Collection.	Depth.	Town.	Residue on Evaporation. Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
1298	Aug. 17,'96	21	Blue Mound	472.8	40.	432.8	white	18.	1.9	.001	.012	none	15.
907	May 28,	29	Champaign	286.	20.	266.	"	11	.8	.016	.04	.014	6 5
1454	Oct. 26,	35	Edwardsville	139 2	5.6	133.6	"	1.6	.8	none	.004	.009	4.
....	April, 1895	25	Galesburg	391.4	67.	323.4	"	13.	1.7	"	.04	none	none
870	May 19,'96	74	Havana	176 8	24.8	152.	"	2 5	.3	.006	.032	.003	2.
871	" 20,	18	Havana	192	10.	182.	brown	1.5	.25	.016	.014	none	.2
572	Mar. 10,	28	Hopkins Park	62.8	6.	56.8	white	.8	.15	.02	.026	"	.3
1559	Oct. 26,	30	Jacksonville	264.	32.	232.	"	14	1.4	none	.042	.006	3 5
824	May 8,	spring	Sycamore	297.6	32.	265.6	"	3.8	.9	"	.02	none	9.
1332	Aug. 31,	28	Urbana	370 8	12.	358.8	"	12.	1 6	.008	.044	"	.5

WELL NUMBER 6.

Chemical examination of water from a tubular drift well one hundred and fifty-three feet deep. (Parts per 1,000,000.)

Number.	Date of Collection.	Appearance: Turbidity.	Appearance: Sediment.	Appearance: Color.	Odor.	Residue on Evaporation: Total.	Residue on Evaporation: Loss on Ignition.	Residue on Evaporation: Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.	Rainfall in inches for the period ending
2	Sept. 13,'95	slight	slight	yellow	....	374.8	61.2	313 6	brown	2.	4.15	.64	.092	none	....	......
13	" 18,	"	"	"	....	380.4	86.	294.4	"	1.5	4.5	1.5	.12	"	....	1.6
23	" 26,	"	"	"	....	377.5	12.4	365.1	"	1.5	3.5	.8	.088	"	....	......
36	Oct. 2,	"	"	"	....	377.6	35.6	342.	"	1.5	4.6	1.	.092	"	.04	.52
56	" 9,	"	"	.2	....	364.2	12.4	351.8	"	2.3	5.1	.8	.092	"	.04	.1
78	" 17,	"	"	.2	....	377.2	17.4	359.8	"	1.8	5.3	.8	.16	"	.08	.06
125	" 29,	consd.	"	.2	....	366.4	18.6	347.8	"	1.5	4.5	.95	.144	"	.04	.....
194	Nov. 14,	slight	little	.05	oily	380.	21.	359.	"	1.5	4.85	.8	.132	"	.14	1.31
211	" 21,	consd.	"	.3	"	372.	17.	355.	"	1.3	5.55	1.	.11	"	.14	.17
229	Dec. 2,	"	"	.5	"	386.	16.	370.	"	1.7	4.7	.9	.13	"	.1	1.73
271	" 17,	slight	none	.1	"	382.8	16.4	366.4	"	1.4	5.9	1.75	.111	"	.03	.16
294	" 21,	distinct	little	.06	"	385.6	22.	363.6	"	1.4	5.15	2.	.172	"	.06	4.08
346	Jan. 2,'96	"	none	.2	"	374.	17.2	356.8	"	1.5	4.5	.8	.09	"	.1	1.29
366	" 10,	"	"	.2	"	367.2	6.4	360.8	"	1.55	4.5	.9	.087	"	.18	.04
394	" 16,	"	"	.4	"	368.8	10.	358.8	"	1.6	5.05	1.1	.096	"	.02	......
416	" 23,	"	little	.2	"	370.8	17.6	353.2	"	1.55	4.7	.95	.226	"	.2	.23
436	" 30,	"	none	.3	"	384.8	28.	356.8	"	1.5	6.1	.9	.346	"	.03	.53
458	Feb. 5,	"	little	.5	"	373.2	15.2	358.	"	1.4	4.6	.7	.182	"	.12	1.09
488	" 14,	"	none	.5	"	363.6	14 8	348.8	"	1.7	4.6	.9	.086	"	.64	.86
515	" 21,	"	"	.4	"	373.6	15 2	358.4	"	1.6	4.8	.95	.074	"	.78	.02
518	" 26,	"	"	.3	"	380.8	13.2	367.6	"	1.7	4.4	.8	.148	"	.16	.2
532	Mar. 2,	"	"	.4	"	379.2	11.2	368.	"	1.9	5.	.8	.088	"	58	.16
552	" 9,	"	"	.4	"	372.	14.	358.	"	1.5	4.7	.85	.114	"	.84	.44
580	" 16,	"	"	.4	"	372.4	14.4	358.	"	1.4	4.6	.87	.072	"	.5	.19
606	" 23,	"	little	5	"	370.	8.	362.	"	4.7	4.2	1.1	.088	"	.8	.29
642	" 30,	"	none	.3	"	379.2	18.4	360.8	"	1.5	4.5	.85	.104	"	.72	.3
672	April 6,	"	little	.5	"	374.	14 4	359.6	"	1 6	4.	.9	.088	"	.6	......
705	" 13,	"	none	.5	"	374.	9.2	364.8	"	1.6	4.5	.85	.08	"	.6	.71
762	" 27,	"	"	5	"	392.	21.6	370.4	"	1.6	4.9	.9	.12	"	.28	.78
795	May 4,	"	little	.5	"	378.4	22.	356.4	"	1.5	4.7	.8	.098	"	.6	1.52
853	" 18,	"	"	.8	"	386.	18.	368.	"	1.5	3.9	.9	.088	"	.58	1.32
980	June 15,	"	"	.6	"	376.8	22.	354.8	"	1.8	4.6	.9	.066	"	.84	5.31
1102	July 14,	"	"	.7	"	382.	28.	354.	"	2.2	5.	.88	.094	"	.108	2.09
1211	Aug. 3,	"	"	.7	"	396.	38.	358	"	1.8	5.2	.96	.076	"	.08	7.66
[illegible]	Aug. [illegible]	distinct	little	[illegible]	oily	[illegible]	[illegible]	[illegible]	brown	[illegible]	[illegible]	[illegible]	[illegible]	none	[illegible]	[illegible]
[illegible]	Sept. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	"	[illegible]	[illegible]	[illegible]	[illegible]	"	.48	3.64
[illegible]	Oct. [illegible]	[illegible]	[illegible]	[illegible]	"	[illegible]	[illegible]	[illegible]	"	1 7	5.	.88	.1	"	.4	.40
[illegible]	Nov. [illegible]	"	"	[illegible]	"	[illegible]	[illegible]	[illegible]	"	1 7	5.7	.88	.104	"	.44	2.1
[illegible]	Dec. [illegible]	"	"	.8	"	372.4	21.2	351.2	"	1.6	5.4	.8	.106	"	1	1.

AVERAGES.

Average	....	377.1	21.4	355.6	....	1.66	4.78	.94	.113	....	.76	......
Highest	....	396.	86.	370.6	....	2.5	6.1	2.	.346	....	.2	......
Lowest	....	363.6	6.4	294.8	....	1 3	3.5	.64	.064	....	02	......

CHEMICAL EXAMINATION OF WATER FROM VARIOUS DEEP DRIFT WELLS.

(Parts per 1,000,000.)

Number.	Date of Collection.	Depth of Well in feet.	Appearance: Turbidity.	Appearance: Sediment.	Appearance: Color.	Residue on Evaporation: Total.	Residue on Evaporation: Loss on Ignition.	Residue on Evaporation: Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.	Location of Well.
784	Apr. 28,'96	35	distinct	little	....	1233.6	26.8	1206.8	brown	.5	7.05	3.375	.206	.000	.6	Wyoming
847	May 14,	30	slight	"	....	630.	20.8	609.2	"	3.9	14.1	....	....	.000	.04	Paris
974	June 11,	70	decided	"	.8	504.	22.	482.	"	13.	5.	1.5	134	.000	.268	Cambridge
994	" 17,	30	"	consd.	yellow	620.8	26.	594.8	"	5.1	14.	19.	4	.000	.2	Paris
995	" 16,	....	"	little	.4	428.	22.	406.	"	2.	5 1	1.2	.14	.001	.14	White Heath
1041	" 28,	170	slight	"	....	719 2	14.	705.2	"	119.	11.8	3.8	.158	.000	.116	Farmer City
1205	Aug. 1,	144	decided	"	1.	652.8	28.	624.8	"	5.3	13.8	7.	.294	.000	.088	Tolono
1293	" 17,	151	"	"	.8	492.8	16.	476 8	"	4.1	6.2	4.	.18	.000	.08	Atlanta
1372	Sept. 14,	72	"	consd.	yellow	746.4	24.	722.4	"	5.5	9.	12.4	.22	.000	.068	Mattoon
1373	" 14,	60	"	"	"	452.8	28.	424.8	"	15.	6.1	10.	.168	.000	.068	Mattoon
1693	Nov. 4,	72	"	"	.3	474.	26.8	447.2	"	12.	8.5	1.36	.152	.000	.1	Newman
1775	Dec. 29,	60	"	little	sl y'l'w	485 6	18.4	467.2	"	16.	7 6	9.	.288	.01	.1	Mattoon
1582	Nov. 2,	75	"	"	.5	568.	16.	552.	"	19.	1.9	.72	.72	.000	.064	Galesburg

The few analyses here tabulated are taken from the records upon pages 28 to 47 inclusive, and are grouped here for the purpose of exhibiting the general characteristics of some of the deep drift waters from the several sections of the State which the samples represent.

CHEMICAL EXAMINATION OF WATER FROM THE DEEP DRIFT WELLS OF THE URBANA AND CHAMPAIGN WATER CO.
Drawn from tap in Chemical Laboratory. (Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Odor.	Residue on Evaporation. Total.	Residue on Evaporation. Loss on Ignition.	Residue on Evaporation. Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.	Rainfall in inches for the week ending
4	Sept. 13,'95	decided	little	yellow	none	404.6	78.	326.6	brown	2.7	3.35	3.75	....	....	....	.....
14	" 18,	slight	"	"	"	406.8	36.	370.8	"	1.5	3.5	3.75	.086	....	....	.....
24	" 26,	"	"	"	"	402.4	26.	376.4	"	1.5	2.7	3.25	.108	....	....	.....
34	Oct. 2,	"	"	"	"	389.	52.6	336.4	"	1.8	3.8	3.75	.14	....	.08	.....
59	" 9,	decided	consid.	.2	"	384.2	37.8	346.4	"	2.	4.	3.	.13	....	.08	.....
81	" 17,	"	"	.2	"	389.8	27.8	362.	"	2.1	3.9	3.75	.146	....	.08	.....
101	" 23,	"	little	.3	"	383.2	21.2	362.	"	2.1	4.2	4.25	.16	....	.06	.....
128	" 30,	"	"	.2	"	392.	25.2	366.8	"	2.2	4.2	3.	.122	....	.04	.....
193	Nov. 14,	much	consid.	.1	"	401.8	24.2	377.6	"	2.05	3.1	3.5	.122	....	.1	.....
214	" 21,	"	"	.1	"	426.8	14.	412.8	red	2.2	4.5	3.	.152	....	.08	.....
234	Dec. 2,	"	little	.6	"	407.2	15.2	392.	"	2.4	4.55	4.	.166	....	.1	.....
273	" 17,	decided	"	.05	"	416.8	34.	382.8	brown	1 8	5.	4.	.208	none	.16	.....
349	Jan. 2,'96	"	"	.1	"	394 8	18.4	376 4	"	2.2	4.25	3.5	.106	"	.1	.....
370	" 10,	much	consid.	.2	"	394.8	18.8	376.	"	2.3	3.9	3.2	.116	"	1	.....
397	" 16,	decided	none	.05	"	388.8	6.4	382.4	"	2.2	3.95	3.5	.1	"	.08	.....
418	" 23,	"	little	.1	"	396	14.	382.	"	1.85	3.6	4.	.186	"	.1	.....
440	" 30,	"	"	.2	"	400.4	11.2	389.2	"	2.	4.1	3.5	.134	"	.02	.....
460	Feb. 5,	"	none	.3	"	398.4	18.4	380.	"	2.1	3.6	4.	.186	"	.18	.....
486	" 13,	slight	little	.08	"	396.4	25 6	370 8	"	2.1	3.8	3.75	.106	"	.6	.....
507	" 21,	decided	"	.1	"	394.8	19 6	375.2	"	2.2	4.15	3.12	.82	"	.032	.....
519	" 26,	much	"	.3	"	406.	32.	374.	"	2.5	3 95	3.75	.138	"	.08	.....
535	Mar. 3,	decided	none	.6	"	392.	14.8	377.2	"	2.	4.1	3.37	.102	"	.08	.....
551	" 9,	"	little	.3	"	399.6	24	375.6	"	1.9	4.4	3.25	.142	"	.108	.....
579	" 16,	much	consid.	.3	"	402.	14.4	387.6	"	2.4	3.6	3.25	.124	"	.02	.....
605	" 23,	"	none	.3	"	395.2	22.8	372.4	"	2.1	3 85	3.75	.08	"	.07	.....
641	" 30,	"	little	.4	"	406.4	19.6	386 8	red	2.05	4.1	3.	.126	"	.072	.....
671	April 6,	"	much	yellow	"	466.8	12.	454.8	"	2.1	5.9	3.5	.174	"	.08	.....
675	" 7,	decided	little	"	"	400.4	10.4	390.	"	2.1	3.6	3.24	.106	"	.14	.....
700	" 13,	"	"	"	"	405.6	22.	383.6	brown	2.1	4.35	3 75	.07	"	.044	.....
732	" 20,	"	none	.5	"	405.6	18.	387 6	"	2.1	3 8	3.75	.106	"	.1	.....
761	" 27	"	little	.4	"	408.	32.	376.	"	2 25	5.2	3.5	.178	"	.068	.....
796	May 4,	"	"	.4	"	401.6	18.	383 6	"	2.3	4.2	3.25	.15	"	.04	.....
823	" 11,	"	"	.8	"	407.	23.6	383.4	"	2.2	4.9	3.25	.112	"	.12	.....
852	" 18,	"	"	.5	"	420.	39.6	380.4	"	2.3	4.4	2.87	.15	"	.052	.....
888	" 25,	"	"	.4	"	402.	20.	382.	"	2.2	4.6	3.5	.144	"	.044	.....
[illegible]	June [illegible]	decided	little	[illegible]	none	[illegible]	[illegible]	[illegible]	brown	[illegible]	[illegible]	[illegible]	[illegible]	none	[illegible]	
[illegible]	" [illegible]			[illegible]		[illegible]	[illegible]	[illegible]	"	[illegible]	[illegible]	[illegible]	[illegible]	"	[illegible]	.....
970	" 15,	"	"	[illegible]	"	400	20.	380	"	2.5	4.5	3.5	[illegible]	"	.144	.....
1012	" 22,	"	"	[illegible]	"	389.6	27.6	362	"	2.6	5.4	3.	.12	"	.088	.....
1046	" 29,	"	"	.8	"	402.	22.	380.	"	2.6	4.7	3.25	.102	"	....	.....
1071	July 6,	"	"	.8	"	406.	32.	374.	"	2.8	4 3	3.4	.138	"	.14	.....
1100	" 13,	"	"	.8	"	398.4	36.4	362.	"	2.7	4.4	3.4	.118	"	.104	.....
1135	" 20,	"	"	.8	"	414.	32.	382.	"	3.	4 3	3 8	.15	"	.136	.....
1178	" 27,	"	"	.8	"	408.	34 3	374.	"	2.5	4.	3.2	.108	"	.4	.....
1210	Aug. 3,	"	"	.9	"	403.2	28.4	374.8	"	2.7	4.4	3.8	.104	"	.156	.....
1245	" 10,	"	"	.9	"	410.8	25.	385.8	"	2.8	6.	1.28	.116	"	.12	.....
1310	" 24,	"	"	.9	"	408.	14.	394.	"	2.7	3 9	3.2	.112	"	.08	.....
1329	" 31,	"	"	.8	"	403.6	14.	389 6	"	2.9	4 4	3.	.116	"	.08	.....
1349	Sept. 7,	"	"	.9	"	410.	20.	390.	"	2.9	4.8	3.4	.124	"	.08	.....
1371	" 14,	"	"	.8	"	419.6	30.	389.6	"	3 4	4.1	3 3	.168	"	.064	.....
1392	" 21,	"	"	.9	"	405.6	18.	387.6	"	3.1	5.2	3 3	.17	"	.04	.....
1416	" 28,	"	"	.8	"	400.	18.4	381.6	"	2 8	4.9	3 4	.092	"	.044	.....
1439	Oct. 5,	"	"	.8	"	392.	24	368.	"	2.9	4.7	3 3	.094	"	.056	.....
1488	" 12,	"	"	.8	"	398.	21.2	376 8	"	2 2	5.	3.2	.112	"	.032	.....
1520	" 19,	"	"	.8	"	396.	16.	380.	"	2.3	4 7	3.2	.1	"	.108	.....
1551	" 26,	"	"	.7	"	394.8	35.6	359.2	"	2 2	4.9	3.8	.136	"	.028	.....
1579	Nov. 2,	"	"	.8	"	402.4	28	374.4	"	2.2	4 3	3.4	.13	"	.252	.....
1604	" 9,	"	"	.6	"	396.8	30.	368.8	"	2.3	4 5	3.4	.124	"	.228	.....
1632	" 16,	"	"	6	"	408 8	18.	390 8	"	2.5	5.4	3.6	.112	"	.268	.....
1656	" 23,	"	"	.5	"	396.8	24.	372.8	"	2.4	4.7	3.	.134	"	.248	.....
1676	" 30,	"	"	.3	"	390.	32.	358.	"	2.	4.6	3 4	.106	"	.072	.....
1699	Dec. 7,	"	"	.4	"	398.	14.	384.	"	2.6	4 8	3.	.11	"	.06	.....
1721	" 14,	"	"	.7	"	409.2	24.	385.2	"	2.5	4.9	3 3	.186	"	056	.....
1752	" 21,	"	"	.6	"	402.8	37.2	365 6	"	2 7	5.2	3.2	.14	"	.14	.....
1771	" 28.	"	"	.7	"	411.2	27.6	383 6	"	2.2	5 8	3.2	.158	"	.056	.....

AVERAGES.

	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Rainfall
Average	403 3	24.7	377 6	....	2.33	4 3	3.39	.125	....	.09	.....
Highest	466.8	78.	454.8	....	3.40	6.	4.25	.208	....	.268	.....
Lowest	383.2	10.4	326.6	....	1.50	2.7	1.28	.07	....	.02	.....

ANALYSIS BY CHARLES SMART, SURGEON U. S. ARMY, WASHINGTON, D. C.

	Total.	Loss on Ignition.	Fixed.	Color on Ignition.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Rainfall
March 4, 1887	420.	100.	....	....	3.	28.5	3.52	.185	.000	.493	.....

The essential constancy in the quantities of the constituents of this water for the fifteen months just ended is apparent on inspection of the above data. During the last eight years many analyses of water from this source have been made in the chemical laboratory of the University of Illinois. and the results of these have frequently impressed us with the fact that the variations in its composition are exceedingly slight. Unfortunately the records of these ananyses were lost last summer and consequently we cannot present the figures. However this water was analyzed in 1887 by Dr. Charles Smart, Surgeon U. S. Army, of Washington, and the results of his analysis are herewith given. To facilitate comparison with our own analyses we have moved the decimal point to make the results read parts per million. As Dr. Smart reports free ammonia and albuminoid ammonia and not nitrogen, it is necessary to reduce his figures 3-17 in order to make them strictly comparable with ours.

SURFACE WATERS.

Our work upon the surface waters of the State has been in the main limited to the analysis of samples from the Illinois river and several of its tributaries, including the Illinois and Michigan canal, but includes also some examinations of the water of the Mississippi. The waters which we have regularly analyzed have been collected from the Illinois and Michigan canal at Lockport, the Des Plaines river at Lockport, the Kankakee river at Wilmington, the Illinois river at Morris, La Salle, Havana, and Kampsville, with occasional samples from Peoria, and the Spoon river near Havana. During some months also, we have made analyses of water from the Mississippi river at Alton, Golden Eagle, and Quincy, and from the Vermilion river at LaSalle., The collection of samples of water from most of these places has been made for us by the local health commissioners, or by other town officers, who have very materially aided us in our work. We are under especially great obligations to the Hon. A. E. Palmer, mayor of Morris; Mr. C. H. Kaehler, secretary of the school board, Wilmington; Mr. William Eraser, M.D., health commissioner, LaSalle; Mr. C.V. Brainerd. C.E., assistant engineer on the United States work of "Improvement of the Illinois river" at Kampsville; and Mr. L. P. Schussler, M.D., LL.D., health commissioner, of Alton, for continued kindnesses and valuable aid, which have been bestowed upon us regardless of the inconvenience and labor in which it has involved them. To these gentlemen and to numerous others to whom we are indebted for similar courtesies we wish to express our most sincere thanks.

The results of analyses of surface waters which follow, present the material from which much of interest might be drawn, but the limited time in which this preliminary report has been drawn up and the press of other duties prevent

any extensive digestion and discussion of the data which are here recorded, and we must consequently defer the consideration of the details until another occasion.

Consequently we confine ourselves for the present to merely calling attention to the fact which our results show conclusively, that the Illinois and Michigan canal and the Illinois river were during the fall of 1895 and the year 1896 much more fully charged with sewage than they were in 1888 and 1889, the time of the extensive investigations made by Professor J. H. Long under the direction of the State Board of Health. In several places we have inserted the averages of some of Professor Long's results in order to facilitate the comparison.

CHEMICAL EXAMINATION OF WATER FROM THE KANKAKEE RIVER AT WILMINGTON.

(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total.	Residue on Evaporation. Dissolved.	Residue on Evaporation. Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Nitrogen as Albuminoid Ammonia.	Nitrogen as Nitrites.	Nitrogen as Nitrates.	Nitrogen as Total Organic.
28	Sep. 27,'95	slight	cons'd.	......	230.8	....	......	31.6	......	......	3.7	6.7	.072	.388	.002	.04	......
49	Oct. 3,	"	little	......	224.8	......	......	15.6	......	......	3.7	5.2	.06	.28	none	none	......
63	" 11,	"	"	.1	250.2	......	......	19.4	......	......	4.2	6.3	.04	.27	.07	.03	......
102	" 18,	"	"	.1	221.4	......	......	15.	......	......	4.4	4.5	.028	.206	none	.12	......
110	" 24,	"	"	.1	232.4	......	......	5.6	......	......	4.9	5.	.036	.266	"	.1	......
138	" 31,	"	"	.1	239.6	......	......	6.4	......	......	4.6	4.6	.025	.209	"	.1	......
179	Nov. 7,	"	"	.1	238.8	......	......	9.	......	......	4.4	3.5	.056	.208	"	.04	......
201	" 13,	"	"	.1	234.8	......	......	7.2	......	......	4.2	3.	.026	.158	"	.05	......
219	" 25,	"	"	.1	244.8	......	......	5.8	......	......	3.6	2.9	.01	.14	"	.14	......
286	Dec. 18,	"	"	.1	310.4	......	......	12.8	......	......	1.9	5.	.028	.236	.025	2.8	......
365	Jan. 7,'96	slight	cons'd.	.15	297.2	......	......	24.8	......	......	3.	14.	.5	.46	.08	6.	1.5
375	" 8,	"	"	.2	316.	......	......	34.8	......	......	3.4	14.7	.5	.636	.06	7.44	......
409	" 20,	"	"	.2	366.	356.8	9.2	12.	......	......	4.1	13.5	.55	.78	.11	6.75	.9
498	Feb. 15,	"	"	.2	274.4	272.	2.4	20.	......	......	3.6	8.3	.02	.42	.012	4.5	1.
517	" 24,	"	"	.15	295.2	291.2	4.	15.2	......	......	2 6	11.2	.02	.324	.02	3.25	.9
544	Mar. 4,	dist'ct	"	.2	254.	242.	12.	24.	......	......	2.	6.5	.035	.296	.02	3.75	.9
575	" 12,	"	"	.3	248.4	......	......	21.2	......	......	2.2	7.4	.03	.39	.04	4.	.8
607	" 19,	"	"	.3	254.	......	......	13.6	......	......	2.4	8.	.01	.31	.015	3.	1.1
673	Apr. 3,	"	"	.4	263.6	254 8	8.8	11.2	......	......	1.7	11.4	.022	.43	.015	2.75	1.1
753	" 18,	"	"	.4	295.6	291.2	4.4	16.4	......	......	2.	13.5	.036	.64	.04	1.25	......
797	" 30,	"	"	.5	322.	307.6	14.4	16.4	......	......	2.8	12.7	.025	.52	.05	2.25	.95
818	May 7,	"	"	.7	326.4	311.2	15.2	26.	......	......	2.1	16.5	.032	.608	.035	1.3	......
857	" 15,	"	"	.7	337.2	322.4	14.8	41.2	......	......	1 9	17.7	.072	.68	.03	1.	1.4
882	" 21,	"	"	.5	324.	......	......	22.	......	......	2 5	12.	.056	.382	.04	1.5	1.1
919	" 28,	"	"	.6	262.8	207.2	55.6	14.	......	......	1.	12.9	.058	.44	.07	1.5	1.1
938	June 4,	"	"	.7	288.4	.....	......	26.4	......	......	1.2	16.2	.05	.64	.06	1.25	1.5
1013	Jun. 19,'96	dist'ct	cons'd.	.5	306.8	282.	24.8	26.8	......	......	1.5	16.4	.048	.52	.026	2.25	1.3
1035	" 25,	"	"	.6	270.8	240.4	29.6	28.	......	......	1.7	16.	.062	.54	.025	1.25	1.4
1072	July 3,	"	"	.7	272.8	262.	10.8	72.	......	......	1.3	18.	.074	.56	.008	.9	1.2
1239	Aug. 7,	"	"	1.	308.8	273.6	35.2	27.2	......	......	1.4	17.7	.038	.6	.015	.9	1.36
1288	" 17,	"	"	1.	315.6	286.	29.6	10.8	......	......	1.4	17.2	.056	.72	.05	1.3	1.44
1333	" 26,	"	"	.9	298.8	281.6	17.2	16.	......	......	1.5	17.9	.027	.508	.015	.7	1.04
1343	Sep. 3,	"	"	.8	292.8	260.8	32.	13.2	......	......	2.	21.5	.046	.56	.002	.5	1.12
1377	" 14,	"	"	1.	300.8	272.8	28.	14.	......	......	1.	18.5	.062	lost	none	.5	1.2
1394	" 21,	"	"	.9	290.	257.6	32.4	8.	......	......	1.9	18.1	.024	.64	.006	.4	1.2
1425	" 28,	"	"	.6	317.6	258.8	58.8	16.	......	......	2.3	18.7	.014	.64	none	.4	.96
1442	Oct. 4,	"	"	.4	310.	232.	78.	18.	......	......	2.4	13.5	.008	.36	.015	1.3	.96
1501	" 12,	"	"	.6	294.4	268.	26.4	24.	......	......	1.9	14.5	.016	.48	none	.9	1.04
1522	" 19,	"	"	.6	276.	260.	16.	12.	......	......	2.	14.7	.08	.4	"	.5	1.12
1554	" 26,	"	"	.5	268.	264.8	3.2	18.	......	......	2.7	14.4	.014	.48	"	.36	.96
1585	Nov. 2,	"	"	.6	278.8	262.	16.8	10.	......	......	2.6	15.2	.018	.48	"	.2	.8
1627	" 10,	"	"	.5	298.8	290.4	8.4	19.6	......	......	3.8	13.	.006	.44	.002	1.2	1.04
1647	" 17,	"	"	.3	294.8	288.	6.8	20.4	......	......	3.7	9.2	.018	.36	.002	2.	1.04
1659	" 23,	"	"	.4	316.2	302.	14.2	30.6	......	......	3.8	8.9	.028	.4	none	1.08	1.32
1687	Dec. 2,	"	"	.4	307.2	305.6	1.6	16.	......	......	3.5	8.8	.004	.32	.002	1.7	.88
1706	" 7,	"	"	.5	308.	300.	8.	14.	......	......	5.2	12.8	.008	.4	none	1.1	.88
1723	" 14,	"	"	.4	296.8	290.6	6.2	20.8	......	......	3.6	11.5	.01	.32	.002	1.3	.96

AVERAGES.

		Residue Total.	Dissolved.	Suspended.	Loss on Ignition Total.	Dissolved.	Suspended.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
For period Sept. 28 to Dec. 18, 1895.	Average	242.8	......	......	12.8	......	......	3.96	4.67	.038	.236	.01	.342	......
	Highest	310.4	......	......	31.6	......	......	4.9	6.7	.072	.388	.07	2.8	......
	Lowest	221.4	......	......	5.6	......	......	1.9	2.9	.01	.14	none	none	......
For period Jan. 7 to Dec. 14, 1896.	Average	295.9	277.2	20.1	20.9	......	......	2.4	13.8	.072	.491	.023	1.95	1.1
	Highest	366.	356.8	78.	72.	......	......	5.2	21.5	.55	.78	.11	7.44	1.5
	Lowest	248.4	207.2	1.6	8.	......	......	1.	6.5	.004	.296	none	.2	.8

RESULTS OF PROFESSOR J. H. LONG'S ANALYSES.

		Residue Total.	Dissolved.	Suspended.	Loss on Ignition Total.	Dissolved.	Suspended.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
May 4 to Sept. 21, 1888. Nineteen analyses; for nitrates, only eight.	Average	251.4	......	35.6	......	......	......	1.015	12.661	.114	.585	.....	.094	......
	Highest	422.2	......	274.	......	......	......	2.584	19.52	.272	.784	......	1.323	......
	Lowest	205.	......	10.2	......	......	......	.354	8.	.044	.378	.....	trace	......

CHEMICAL EXAMINATION OF WATER FROM THE DESPLAINES RIVER AT LOCKPORT.
(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance.			Residue on Evaporation.						Chlorine.	Oxygen Consumed.	Nitrogen as				
		Turbidity.	Sediment.	Color.	Total.	Dissolved.	Suspended.	Loss on Ignition.					Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
								Total.	Dissolved.	Suspended.							
523	Feb. 25,'96	......	......	......	380.4	373.6	6.8	12.8	......	......	5.5	6.3	*	......	.02	2.	......
542	Mar. 2,	......	......	......	234.4	216.	18.4	18.	......	......	2.7	8.5	......	......	.04	2.	......
558	" 9,	......	......	......	312.	300.	12.	22.8	......	......	3.85	8.	......	......	.04	2.7	......
585	" 16,	......	......	......	328.	314.4	13.6	12.	......	......	4.6	7.1	......	......	.012	2.	......
617	" 23,	......	......	......	342.	338.8	3.2	16.4	......	......	4.8	5.2	......	......	.02	2.75	......
657	" 30,	......	......	......	328.8	303.2	25.6	7.6	......	......	4.4	7.9	......	......	.02	4.75	......
689	Apr. 6,	......	......	......	305.2	304.4	.8	9.6	......	......	3.7	11.8	......	......	.04	1.75	......
725	" 15,	......	......	......	390.8	368.4	22.4	25.6	......	......	5.	8.2	......	......	.04	.85	......
768	" 24,	......	......	......	350.	336.4	13.6	21.6	......	......	4.6	11.8	......	......	.025	1.25	......
811	May 4,	......	......	......	374.	372.8	1.2	8.8	......	......	4.6	11.2	......	......	.012	.2	......
838	" 11,	......	......	......	361.2	356.	5.2	19.2	......	......	4.6	9.2	......	......	.002	.3	......
866	" 18,	......	......	......	355.2	340.	15.2	2.8	......	......	5.5	7.5	......	......	.002	.1	......
906	" 26,	dist'ct	cons'd.	.5	326.8	322.	4.8	27.2	......	......	4.2	8.1	.036	.56	.004	.55	.57
930	June 1,	"	"	.8	310.8	294.4	16.4	24.	......	......	3.4	12.5	.058	.44	.06	1.	1.1
967	" 9,	slight	little	.15	342.8	340.	2.8	17.2	......	......	3.	11.5	.042	.38	.002	.3	.9
987	" 16,	dist'ct	cons'd.	.15	394.	386.	8.	18.	......	......	6.2	9.1	.05	.64	.002	.15	1.1
1029	" 23,	......	......	......	380.8	376.	4.8	18.	......	......	7.5	11.5	.068	.52	.002	.25	1.
1060	" 30,	......	......	......	404.	......	......	22.	......	......	8.8	10.6	.034	.468	none	.15	1.02
1090	July 7,	......	......	......	536.	496.	40.	56.	......	......	4.	10.7	.076	.48	.008	.1	.88
1118	" 14,	......	......	......	626.	618.	8.	16.	......	......	120.	8.2	.236	.36	.02	.4	.8
1164	" 21,	......	......	......	682.	651.2	30.8	28.	......	......	134.	7.	.202	.32	.018	.3	.84
1187	" 28,	......	......	......	422.4	412.	10.4	16.	......	......	29.	8.7	.098	.4	.015	.5	.8
1222	Aug. 3,	dist'ct	little	.2	526.	524.	2.	14.	......	......	32.	9.1	.096	.4	.002	.3	.96
1263	" 11,	"	"	.2	478.4	......	......	24.8	......	......	26.	8.8	.092	.48	.02	.6	.88
1303	" 18,	"	cons'd.	.1	688.8	648.	40.8	48.	......	......	31.	7.4	.118	.48	.003	.5	.8
1316	" 25,	"	little	.05	454.8	451.6	3.2	16.	......	......	54.	7.6	.108	.36	.025	.5	.8
1330	Sep. 1,	dist'ct	cons'd.	.3	559.6	534.8	24.8	26.	......	......	29.	7.	.072	.4	.005	.3	.56
1355	" 7,	"	"	.15	841.6	802.4	39.2	20.	......	......	167.	7.3	.216	.48	.025	.5	.96
1370	" 14,	"	little	.4	646.4	642.4	4.	25.6	......	......	43.	7.8	.488	.4	.17	.9	.8
1400	" 21,	"	cons'd.	.1	436.	409.6	26.4	10.8	......	......	22.	8.5	.078	.54	.033	.5	1.04
1423	" 28,	"	"	.3	319.6	308.8	10.8	10.	......	......	9.5	8.5	.01	.44	.002	.3	.88
1453	Oct. 6,	none	none	.5	344.	344.	0.0	14.	......	......	10.	8.6	.01	.4	.008	.7	......
1503	" 13,	"	"	.3	356.	356.	0.0	22.	......	......	5.	9.5	.008	.36	none	.4	.88
1539	" 20,	slight	little	.5	344.	342.	2.	16.8	......	......	5.	9.3	.006	.4	"	.2	.8
1574	" 29,	"	"	.2	421.6	416.	5.6	20.	......	......	26.	8.8	.068	.44	.025	.5	.64
1588	Nov. 3,	"	"	.1	560.8	560.	.8	26.8	......	......	20.	8.3	.212	.36	.045	.4	.8
1626	" 10,	"	"	.3	410.8	396.	14.8	22.	......	......	9.	8.4	.01	.28	.002	.28	.64
1648	" 17,	"	"	.4	440.8	436.	4.8	24.	......	......	8.5	8.2	.028	.4	.023	1.5	1.
1664	" 24,	dist'ct	"	m'd'y	444.	427.2	16.8	20.	......	......	9.	12.5	.03	.4	.006	1.2	1.04
1682	" 30,	"	"	.5	470.	465.6	4.4	18.	......	......	9.	9.1	.034	.32	.012	2.2	.88
1703	Dec. 7,	"	"	.4	488.8	473.2	15.6	24.8	......	......	7.7	7.7	.024	.36	.009	2.	.72
1728	" 14,	"	"	m'd'y	465.6	454.	11.6	21.2	......	......	8.	7.6	.078	.44	.008	1.3	.64
1762	" 21,	"	"	.1	674.4	672.4	2.	20.8	......	......	129.	6.9	.182	.24	.009	1.4	.48

AVERAGES.

	Total.	Dissolved.	Suspended.	Loss on Ignition Total.	Dissolved.	Suspended.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
Average	438.6	408.9	11.5	20.5	......	......	24.	8.7	.092	.417	.019	.95	.84
Highest	841.6	802.4	40.8	56.	......	......	167.	12.5	.488	.64	.06	4.75	1.1
Lowest	234.4	216.	0.0	7.6	......	......	2.7	5.2	.01	.24	none	.1	.48

*Blank spaces in this table, except those in the two columns under Loss on Ignition, are due to the partial destruction of our records by fire.

The variations in content of the several constituents is in part due to admixture of canal water or water from artesian wells which is strongly impregnated with salt, with the water of the stream, since the point at which collections of the samples have hitherto been made is not sufficiently distant from these sources of contribution.

CHEMICAL EXAMINATION OF WATER FROM THE ILLINOIS RIVER AT MORRIS.

(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Sediment.	Color.	Residue on Evaporation. Total.	Dissolved.	Suspended.	Loss on Ignition. Total.	Dissolved.	Suspended.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
39	Oct. 2,'95	dist'ct	little	......	370.8	......	......	20.8	......	......	73.	5.7	8.5	.643	.125	.075	......
64	" 10,	"	cons'd.	.1	381.8	......	......	14.6	......	......	80.5	8.9	10.5	.63	......	.18	......
107	" 22,	"	"	.1	419.2	......	......	18.8	......	......	92.5	7.6	13.12	1.17	.01	.17	......
141	" 31,	"	"	.4	356.2	......	......	10.	......	......	64.	7.8	9.5	.652	.015	.22	......
183	Nov. 9,	"	"	.5	357.2	......	......	13 2	......	......	75.5	6.1	10.68	.834	.012	.1	......
206	" 18,	"	"	1.	457.8	......	......	15.8	......	......	84.5	12.2	12.	1.75	.01	.1	......
236	" 30,	decid.	much	.4	503.6	......	......	20.	......	......	82.	14.1	14.	1.6	.028	.3	......
281	Dec.16,	"	"	.03	412.	......	......	21.2	......	......	52.	13.5	8.	.9	.003	.12	1.5
363	" 30,	"	"	m'd'y	410.4	232.	178.4	26.8	21.2	5.6	7.5	17.1	.11	.952	.3	8.2	1.5
382	Jan. 9,'96	dist'ct	little	.15	372.	......	......	32.	......	......	16.	14.4	1.6	.86	.2	11.8	......
447	" 29,	"	much	.3	379.2	362.8	16.4	20.	18.	2.	27.	10.3	3.75	.804	.18	3.25	1.6
504	Feb 19,	"	cons'd.	.2	292.	282.	10.	24.8	18.	6.8	4.8	10.5	.6	.454	.04	3.75	.9
528	" 28,	decid.	"	.5	308.8	267.2	41.6	12.	12.	0.0	12.	11.5	1.2	.7	.04	2.5	1.2
597	Mar 17,	slight	little	.15	326.	320.4	5.6	14.	13.6	.4	21.	9.5	1.9	.68	.04	3.25	1.3
648	" 30,	dist'ct	cons'd.	.2	346.4	323.6	22.8	14.4	13.6	.8	25.	11.8	2.6	.6	.045	4.5	1.5
693	Apr. 8,	decid.	"	.5	392.	358.	34.	20.	20.	0.0	30.	14.	3.5	.76	.045	1.75	1.8
721	" 15,	slight	little	.4	356.8	354.4	2.4	12.8	12.8	0.0	22.	11.7	4.	.52	.06	1.25	1.3
767	" 25,	decid.	cons'd.	.5	372.	303.2	68.8	26.8	21.2	5.6	4.8	12.4	.1	.44	.04	3.75	1.2
810	May 6,	slight	little	.5	314.4	310.	4.4	12.	12.	0.0	6.	12.4	.3	.4	.09	1.75	1.25
898	" 26,	decid.	much	m'd'y	666.	270.4	395.6	38.	21.6	16.4	12.	26.6	1.5	1.2	.11	1.37	2.9
961	June 8,	dist'ct	cons'd.	.3	385.6	368.4	17.2	36.	20.4	15.6	40.	14.2	6.2	.48	.2	.8	1.65
1002	" 18,	decid.	"	.4	378.4	356.	22.4	26.4	24.	2.4	30.	12.	3.8	.5	.2	1.75	1.2
1093	July 9,	"	"	......	480.	452.	28.	40.	26.	14.	73.	28.3	9.6	1.2	.14	.5	1.84
1124	" 15,	dist'ct	"	......	343.6	......	......	27.6	......	......	53.	13.9	5.8	.64	.45	.7	1.28
1153	" 20,	"	"	......	327.2	......	......	21.6	......	......	48.	11.5	4.8	1.	.75	1.5	1.1
1181	" 27,	decid.	much	......	344.	228.8	115.2	36.	28.	8.	13.	16.8	1.12	.64	.21	2.2	1.44
1217	Aug. 3,'96	decid.	cons'd.	.7	338.4	306.4	32.	30.	15.2	20.8	23.	15.1	2.	.72	.35	1.2	2.08
1249	" 10,	"	"	.6	310.2	271.2	48.	39.2	34.	5.2	18.	17.3	1.1	.4	.75	.6	1.36
1301	" 17,	"	"	m'd'y	372.8	320.8	52.	14.	14.	0.0	21.	16.9	1.28	.88	.5	1.7	1.6
1318	" 25,	dist'ct	"	.8	296.8	269.6	27.2	10.	8.	2.	14.	17.4	.8	.6	.25	.8	1.44
1342	Sep. 1,	"	"	.8	307.6	280.8	26.8	22.	13.2	8.8	20.	17.5	2.16	.72	.07	.9	1.04
1353	" 7,	decid.	"	.5	383.6	347.6	36.	24.	24.	0.0	45.	15.	6.8	.8	.05	.4	1.2
1387	" 14,	dist'ct	"	.1	373.6	354.4	19.2	22.	18.	4.	52.	13.	7.4	.56	.012	.3	1.2
1398	" 21,	v.sl'ht	little	.5	406.8	400.	6.8	18.	12.4	5.6	49.	15.8	5.	.88	.046	.5	1.12
1428	" 28,	slight	"	.4	344.	329.2	14.8	16.	10.4	5.6	36.	15.4	4.4	.8	.1	.3	1.04
1443	Oct. 5,	decid.	cons'd.	.3	380.4	340.	40.4	11.2	12.	0.0	25.	12.4	2.	.4	.08	1.1	.96
1502	" 12,	"	"	m'd'y	400.	357.2	42.8	50.	17.2	32.8	34.	13.5	4.	.68	.09	.9	1.36
1523	" 19,	distc't	"	"	352.	326.	26.	21.6	18.	3.6	35.	13.6	4.6	.8	.015	1.1	1.52
1572	" 28,	"	"	.4	351.6	339.6	12.	20.8	16.	4.8	41.	14.1	6.2	.64	.013	.1	1.2
1586	Dec. 2,	"	"	m'd'y	358.8	335.6	23.2	20.	16.4	3.6	39.	14.7	6.	.48	.022	.1	1.52
1617	" 8,	"	"	"	399.2	......	......	19.2	......	......	38.	13.4	4.	.96	.015	1.3	1.52
1729	" 14,	slight	little	"	387.2	379.2	8.	21.2	21.2	0.0	34.	12.1	3.6	.64	.025	1.	1.76
1759	" 21,	"	"	"	385.2	374.4	10.8	20.	9.2	10.8	41.	15.6	4.8	1.16	.025	.5	1.76
1786	" 29,	v.sl'ht	v.litt'e	"	388.	387.2	.8	18.	18.	0.0	39.	14.8	5.	.8	.01	.9	1.6

AVERAGES.

Period		Total.	Dissolved.	Suspended.	Loss Total.	Loss Dissolved.	Loss Suspended.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
For period October 2, to December 30. 1895.	Average	407.4	......	......	17.9	......	......	67.94	10.3	9.6	1.015	.064	1.052	......
	Highest	503.6	......	......	26.8	......	......	92.5	17.1	14.	1.75	.3	8.2	......
	Lowest	356.2	......	......	10.	......	......	7.5	5.7	.11	.63	.003	.075	......
For period January 9, to December 29, 1896.	Average	369.4	331.5	39.	23.4	17.3	5.8	29.7	14.5	3.55	.709	.149	1.72	1.44
	Highest	666.	452.	395.6	50.	34.	32.8	73.	28.3	9.6	1.2	.75	11.8	2.9
	Lowest	292.	228.8	.8	10.	9.2	0.0	4.8	9.5	.1	.4	.01	.1	.9

THE RESULTS OF PROFESSOR J. H. LONG'S ANALYSES ARE AS FOLLOWS:

Period		Total.	Dissolved.	Suspended.	Loss Total.	Loss Dissolved.	Loss Suspended.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
1888— May 5 to Oct. 27, 24 analyses.	Average	355.9	......	30.85	......	......	......	32.149	10.92	4.107	.707	......	.367	......
	Highest	441.6	......	120.	......	......	......	56.99	22.4	12.62	1.2	......	4.032	......
	Lowest	273.4	......	3.9	......	......	......	3.54	5.6	.338	.088	......	.000	......

CHEMICAL, EXAMINATION OF WATER FROM THE ILLINOIS RIVER AT LASALLE.
(Parts per 1,000,000.)

Number	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total.	Residue on Evaporation. Dissolved.	Residue on Evaporation. Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Chlorine.	Oxygen Consumed. Unfiltered.	Oxygen Consumed. Filtered.	Nitrogen as Ammonia. Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.	Total Organic. Total.	Total Organic. Dissolved.	Total Organic. Suspended.	Nitrites.	Nitrates.
385	Jan. 9,'96	dist'ct	little	.15	378.8	...	...	24.	...	...	10.	7.5	...	.7	.538	...	...	...	...	...	.06	5.75
406	" 20,	"	consd.	.05	416 4	414.4	2.	16.	16.	0.0	11.	7.	*	1 1	.43	...	...	.8	...	...	.11	6.
431	" 27,	"	"	.3	317 6	301.2	16.4	16 4	12.4	4.	12.	12.5	...	1.6	.756	...	...	1.2	...	...	.055	8.
472	Feb. 7,	decid.	"	md'y	311.6	286.	25.6	18.4	18.4	0.0	10.	9.2	...	82	.604	...	...	1 1	...	...	.041	5.
495	" 17,	"	little	.2	342.8	331.2	11.6	20.	9.2	10.8	17.	8.3	...	1.45	.474	...	...	.85	...	...	.045	3.25
516	" 24,	"	much	md'y	815.6	244.	571.6	33.6	20.8	12.8	6.7	27.1	...	1.	1.36	...	...	3.25	...	...	.03	1.5
537	Mar. 2,	dist'ct	consd.	"	286.8	250.	36 8	22.	16.8	5.2	8.	8.6	...	.7	.582	...	...	1.1	...	...	.075	3.5
556	" 9,	"	"	.15	312.8	282.4	30.4	18.	18.	0.0	8.5	8.2	...	.5	.504	...	...	1.1	...	...	.02	3.
587	" 17,	"	"	.1	296.8	279.2	17.6	16.8	13.2	3.6	9.	8.5	...	.6	.36	...	...	.8	...	...	.023	2.75
634	" 25,	"	"	.2	312.	292.4	19.6	11.2	11.2	0.0	15.	8.3	...	1 2	.44	...	...	1.15	...	...	.035	3.5
676	Apr. 6,	"	little	.5	310.	304.	6.	10.8	10.8	0 0	11.5	8.6	...	1.1	.52	...	...	.9	...	...	.065	1.75
707	" 13,	"	consd.	.4	344.	306.4	37 6	10.	10.	0 0	14.	11.8	...	1.3	.52	...	...	1.15	...	...	.15	1.8
746	" 20,	"	"	.4	352 8	325.2	27.6	14.4	14.4	0.0	16.	11.5	...	.8	.56	...	...	1.2	...	...	.45	1 3
773	" 27,	"	"	.4	359.6	333.2	26.4	30.	21.2	8.8	13.	10.9	...	.3	.56	...	...	1.	...	...	.4	2.
800	May 4,	"	"	.4	354.	332.	22.	20.	18.8	1.2	15.	11.5	...	.7	.4	...	...	.9	...	...	.375	3.5
828	" 11,	"	"	.6	416.	364.8	51.2	22.	20.	2.	20.	14.2	...	1.	.8	...	...	1 4	...	...	.65	1.5
858	" 18,	"	"	.5	388.2	354.	34.2	18.	18.	0.0	25.	12.9	...	.85	.52	...	...	1.3	...	...	.65	2.4
893	" 25,	decid.	much	.4	420.	315.2	104.8	38.	19.2	18.8	16.	10.	...	.5	.44	...	...	.95	...	...	.5	3.75
929	June 2,	"	"	.5	366.8	290.	76.8	30.8	22.	8.8	13.5	13 6	...	.6	.44	...	...	1.3	...	...	.5	2.75
959	" 8,	"	consd.	.4	372.	326.	46.	24.	22.	2.	16.	12.8	...	1.1	.48	...	...	1.5	...	...	.3	2.7
993	" 16,	dist'ct	"	.2	338.	308.	30.	16.	16.	0.0	15.	13.	...	.2	.4	...	...	1.3	...	...	.35	3.3
1016	" 22,	"	"	...	420.	376.	44.	36.	18.	18.	22.	13.7	...	.14	.58	...	...	1.5	...	...	.325	3.25
1050	" 29,	"	"	...	342.	316.	26.	28.	28.	0.0	26.	15.3	...	.3	.6	...	...	1.44	...	...	.65	3.25
1078	July 6,	"	"	...	384.	338.4	45.6	26.	18.4	7.6	33.	16.3	...	.56	.56	...	...	1.6	...	...	.7	2.8
1104	" 13,	"	"	...	390.	344.	46.	36.	32.	4.	46.	13.8	...	.8	.56	...	...	1.52	...	...	.75	2.6
1139	" 20,	slight	little	...	350.	346.8	3.2	28.	24.6	3.4	47.	12.7	...	1.36	.48	...	...	1.12	...	...	.4	2.5
1186	" 28,	"	consd	...	386.8	218.4	168.4	26.	24.	2	11.	15.2	...	.2	.64	...	...	1.28	...	...	.225	1.7
1218	Aug. 3,	dist'ct	"	.3	404.8	318.	86.8	38.	28.	10.	14.	14.4	...	.12	.52	...	...	1.68	...	...	.375	2.7
1275	" 12,	"	"	.3	332.4	298.8	33.6	18.	8.	10.	15.	14.5	...	.068	.56	...	...	1.2	...	...	.2	1.3
1334	" 31,	"	"	.5	386 8	362.	24.8	22.	20.	2	44.	17.8	...	.052	1.12	...	...	2.24	...	...	1.25	2 8
1356	Sept. 7,	"	little	7	361.8	332.8	32.	38.	18.	20.	28.	17.2	...	1.2	1 28	...	...	1.76	...	...	.25	1.7
1379	" 14,	"	consd.	.2	390.8	3·0.	50.8	20.	20.	0.0	33.	14.9	...	1.84	.8	...	...	1.44	...	...	.54	2.
1403	" 23,	"	"	.4	383.6	369 6	14.	14.	14.	0.0	32.	15.	...	1.6	.64	...	...	1.6	...	...	.2	2.2
1426	" 28,	"	"	.3	360.8	348.	12.8	16.	14.4	1.6	34.	13 6	12.3	1.12	.8	.56	.24	.96	...	...	.3	1.2
1449	Oct. 6,	decid.	much	md'y	468.8	335.6	133.2	20.	10.	10.	17.	14.7	...	.48	.8	...	...	1.28	...	...	.1	2.2

CHEMICAL EXAMINATION OF WATER FROM THE ILLINOIS RIVER AT LA SALLE.—*Continued.*
(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total.	Residue on Evaporation. Dissolved.	Residue on Evaporation. Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Chlorine.	Oxygen Consumed. Unfiltered.	Oxygen Consumed. Filtered.	Nitrogen as Ammonia. Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.	Total Organic. Total.	Total Organic. Dissolved.	Total Organic. Suspended.	Nitrites.	Nitrates.
1506	Oct. 14,'96	dist'ct	little	md'y	331 6	320.	11.6	22.4	22.4	0.0	15.	11.3	9.	.76	.56	.32	.24	1.2	.92	.28	.08	1 5
1533	" 20,	"	"	.4	338.4	320.	18.4	22.4	22.4	0.0	21.	11.6	9.	1.2	.72	.56	.16	1.6	1.12	.48	.105	1.5
1560	" 27,	"	"	.4	360.8	328.8	32.	44.	18.8	25.2	23.	12.8	9.4	1.6	.96	.48	.48	1.12	...	...	.095	.7
1593	Nov. 3,	"	consd.	md'y	332.8	315.6	17.2	24.8	21.6	3.2	23.	12.5	9.3	2.08	.4	.384	.016	1 12	.8	.32	.14	1.1
1622	" 10,	"	"	"	356.8	339.6	17.2	21.6	21 6	0.0	20.	11.7	8.8	1.84	.48	.32	.16	1.12	.8	.32	.025	1.3
1639	" 16,	"	little	"	380	348.	32.	40.	22.4	17.6	16.	9.7	7.7	1.04	.56	.32	.24	1.6	1.34	.26	.04	2.4
1668	" 24,	"	"	"	382	344.8	37.2	29.	16.	13.	18.	11.	7.7	1.2	.44	.4	.04	1.6	1.44	.16	.06	1.4
1688	Dec. 3,	slight	"	"	396.8	391.2	5.6	18.	8.	10.	22.	10.9	9.	1.76	.56	.44	.12	1.28	.96	.32	.04	1.8
1705	" 7,	"	"	"	360.8	356.	4.8	12.	12.	0.	17.	11.3	8.8	1.28	.8	.48	.32	1.12	.96	.16	.04	1.8
1739	" 16,	"	"	"	351.2	340 4	10.8	22.	20.	2.	17.	10.5	9.6	1.6	.72	.52	.2	1.28	.88	.4	.05	1.3
1765	" 24,	"	"	.3	370.8	369.6	1.2	14.	10.	4.	21.	9.4	8.5	1.68	.48	.4	.08	1.12	.88	.24	.05	.8
1780	" 29,	"	"	.3	360.	355.2	4.8	16.	15.2	.8	20.	10.6	8.5	1.76	.48	.4	.08	.96	.72	.24	.025	1.1
AVERAGES.																						
Average					372.3	326.4	45.8	23.03	17.7	53.	19.6	12.3	9.04	.971	.612	.429	.183	1.26	.98	.29	.255	2.51
Highest					815.6	414 4	571.	40.	24.	25.	47.	17.8	12.3	2.08	1 36	.56	.48	3.25	1.44	.48	1.25	8.
Lowest					286.8	218.4	1 2	10.	8.	0.0	6.7	7.	7.7	.14	.36	.32	.04	.8	.72	16	.02	.07
PROFESSOR J. H. LONG'S RESULTS ARE AS FOLLOWS:																						
1888— May 7 to Oct. 29. 23 analyses.	Average				345.7	...	50.3	...	...	...	19.717	8.558	...	.623	.526	...	...	...	...	...	1.037	...
	Highest				327.7	...	326.5	...	...	...	44.64	12.64	...	4.32	.93	...	...	...	...	...	3.276	...
	Lowest				291.	...	11.4	...	...	...	3.64	4.4	...	.049	.312	...	...	...	...	...	tr'ce	...
1889— Jan 14 to Mar. 11. 9 analyses.	Average				417.6	...	93 8	...	...	...	13.105	8.582	...	1.456	.637	...	...	...	...	...	.912	...
	Highest				758.	...	534 2	...	...	...	20.296	24.	...	2.808	1.42	...	...	...	...	...	2.709	...
	Lowest				310.	...	4.2	...	...	...	6.018	5.36	...	.535	.372	...	...	...	...	...	tr'ce	...

In comparing the results obtained by Professor Long for the State Board of Health with our own results, it must be noted that in the former the free ammonia and the albuminoid ammonia were stated, each in parts of ammonia per 1,000,000, while in all of the work done by the University, the statement is in parts of nitrogen per 1,000,000.

The blank spaces in the columns marked (*), in the above tables, are due to loss of the records; all other blanks indicate that the corresponding determinations were not made.

Each average has been calculated from the precise number of determinations which appear in the table, consequently the averages for oxygen consumed in the filtered water, the dissolved albuminoid ammonia, and dissolved total organic nitrogen are not of equal signficance with the other averages.

CHEMICAL. EXAMINATION OF WATER FROM THE ILLINOIS RIVER AT PEORIA.

(Parts per 1,000,000)

Number.	Date of Collection.	Appearance. Turbidity.	Sediment.	Color.	Residue on Evaporation. Total.	Dissolved.	Suspended.	Loss on Ignition. Total.	Dis-solved.	Sus-pended.	Chlorine	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Total Organic.	Nitrites.	Nitrates.
31	Sep. 29,'95	slight	little	......	370.	......	......	23.6	......	......	57.	5.5	.13	.28	......	.04	1.16
47	Oct. 6,	"	"	.1	472.2	......	......	20.8	......	......	77.	5.3	.07	.33	......	.08	1.92
88	" 17,	"	"	......	410.	......	......	20.8	......	......	66.	4.9	.08	.112	......	.03	1.77
97	" 21,	decid.	much	m'ddy	548.8	......	......	52.	......	......	75.	15.7	.08	1.4	......	1.25	......
133	" 30,	dist'ct	little	.1	405.	......	......	26.6	......	......	66.	5.3	.11	.416	......	.035	7.39
152	Nov. 5,	"	cons'd.	......	480.	......	......	8.6	......	......	86.	6.6	.06	.824	......	.1	1.8
187	" 11,	slight	little	......	384.8	......	......	14.4	......	......	63.	3.8	.08	.401	......	.06	2.3
328	Dec.27.	decid.	consd.	m'ddy	352.4	293.6	58.8	10.	10.	0.0	31.	10.7	1.3	.762	......	.11	2.
360	Jan. 7,'96	decid.	consd.	m'ddy	298.8	......	......	16.4	......	......	6.4	8.	.7	.326	......	.07	4.5
554	Mar. 9,	dist'ct	little	.3	269.2	255.2	14.	23.2	18.8	4.4	8.	6.8	.4	.27	.5	.035	4.5
997	June17,	"	consd.	.4	350.8	342.8	8.	16.	16.	0.0	19.5	11.8	.35	.7	1.3	.2	2.3
1037	" 27,	slight	little	.4	322.	290.	32.	25.	20.8	4.2	16.	10.7	.15	.36	1.4	.2	1.75
1095	July 11,	dist'ct	consd.	.6	350.	328.4	21.6	22.	18.4	3.6	23.	13.	.08	.56	1.28	.225	1.6
1213	Aug. 1,	"	"	.3	288.	259.6	28.4	17.2	17.2	0.0	12.	8.1	.032	.44	.76	.35	1.9
1305	" 22,	"	"	.4	319.2	313.6	25.6	19.6	19.6	0.0	21.	13.5	.16	.56	1.12	.35	1.5
AVERAGES.																	
Average					370.7	297.6	26.9	21.	17.2	.17	41.8	8.64	.252	.516	1.06	.209	2.59
Highest					548.8	312.8	58.8	52.	20.8	4.4	86.	15.7	1.3	1.4	1.4	1.25	7.39
Lowest					269.2	255.2	8.	8.6	10.	0.0	6.4	4.9	.032	.112	.5	.03	1.16

CHEMICAL EXAMINATION OF WATER FROM THE ILLINOIS RIVER AT HAVANA.

(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Sediment.	Color.	Residue on Evaporation. Total.	Dissolved.	Suspended.	Loss on Ignition. Total.	Dis-solved.	Sus-pended.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Height of river above low water mark.
18	Sep. 24,'95	slight	consd.	.1	295.2	......	......	22.	......	......	32.5	5.3	.67	.282	.15	.4	3.57
32	Oct. 1,	decid.	"	.1	350.6	......	......	47.4	......	......	11.	8.1	.6	.416	.05	.3	2.75
54	" 8,	slight	"	.1	351.6	......	......	15.4	......	......	48.	5.9	.6	.268	.45	1.35	2.2
74	" 15,	"	"	.1	424.8	......	......	11.6	......	......	62.	5.3	.09	.508	.5	.9	2.25
104	" 23,	dist'ct	little	.1	433.	......	......	10.2	......	......	64.	5.7	.64	.364	.35	.45	2.35
129	" 29,	"	"	.1	389.2	......	......	23.2	......	......	56.	5.8	.6	.318	.175	.9	2.25
162	Nov. 5,	"	consd.	.1	398.	......	......	23.4	......	......	60.	6.	.7	.502	.25	1.5	2.37
190	" 11,	slight	"	.1	378.4	......	......	19.6	......	......	56.	5.2	1.5	.47	.25	1.8	2.67
208	" 19,	"	"	.03	370.4	......	......	19.6	......	......	52.	5.3	1.1	.476	.16	2.4	2.75
226	" 26,	decid.	"	.2	384.	......	......	24.	......	......	55.	7.4	.4	.714	.13	2.6	2.9
238	Dec. 3,	"	much	.04	400.2	......	......	11.8	......	......	51.	8.	1.	1.1	.15	3.2	3.2
254	" 10,	dist'ct	"	.03	388.2	......	......	10.8	......	......	47.	11.1	2.	.686	.05	3.95	3.25
291	" 17,	"	consd.	.03	432.8	......	......	25.6	......	......	52.	8.05	2.87	1.01	.017	3.	2.8
323	" 24,	decid.	much	m'ddy	638.8	......	......	26.8	......	......	27.	14.9	2.25	1.28	.06	2.12	10.
341	" 31,	"	consd.	"	536.	......	......	28.	......	......	9.5	9.3	.8	.746	.05	3.4	12.6
AVERAGES.																	
Average					411.4	......	......	21.3	......	......	45.5	7.42	1.05	.609	.189	1.88	......
Highest					638.8	......	......	47.4	......	......	64.	14.9	2.87	1.28	.5	3.95	......
Lowest					295.2	......	......	10.2	......	......	9.5	5.2	.09	.268	.017	.3	......

During the unusually dry seasons of 1894 and 1895 the river was low, and current exceptionally sluggish. The height of water above low water mark is less than appears from the data given, inasmuch as the level has been raised two feet by the construction of dams, while the original gauge is still used.

CHEMICAL EXAMINATION OF WATER FROM THE ILLINOIS RIVER AT HAVANA.

(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance.			Residue on Evaporation.						Chlorine.	Oxygen Consumed.	Nitrogen as					River height above low w'ter
		Turbidity.	Sediment.	Color.	Total.	Dissolved.	Suspended.	Loss on Ignition.					Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.	
								Total.	Dissolved.	Suspended.								
355	Jan. 1,'96	consd.	consd.	m'ddy	288.4	257.2	31.2	20.	19.6	.4	10.	7.8	.8	.426	.07	3.75	1.1	12.6
378	" 8,	much	much	"	384.8	273.6	111.2	20.	20.	0.0	8.	8.	.55	.368	.07	5.93	.8	11.9
400	" 14,	little	little	.6	313.2	308.	5.2	15.2	16.	0.0	9.	8.55	.7	.394	.08	6.25	......	10.6
413	" 21,	dist'ct	"	.15	300.4	298.	2.4	14.4	12.8	1.6	10.	8.	.8	.394	.1	5.5	1.3	9.3
444	" 28,	decid.	consd.	.4	353.6	340.8	12.8	28.4	22.4	6.	12.	11.	1.2	.452	.111	5.	1.2	8.1
467	Feb. 4,	dist'ct	"	m'ddy	338.	302.	36.	22.8	15.2	7.6	12.	10.9	1.2	.532	.055	3.4	1.	8.5
481	" 10,	"	"	"	324.8	298.	26.8	28.	26.	2.	10.	6.5	.9	.352	.05	4.25	1.	8.9
500	" 18,	"	"	"	310.	291.2	8.8	19.2	17.2	2.	9.	7.2	.65	.488	.04	4.25	.82	8.7
525	" 25,	decid.	much	"	2896.	394.	2502.	56.	16.	40.	1.8	45.	.5	2.25	.12	2.	4.75	8.9
540	Mar 3,	dist'ct	consd.	"	323.6	262.	60.8	14.6	14.6	0.0	9.	8.5	.9	.601	.04	4.	.95	10.2
563	" 10,	"	"	.5	269.6	260.	9.6	16.4	16.4	0.0	8.5	6.4	.7	.484	.045	3.5	.7	10.
589	" 17,	"	"	.1	304.8	282.	22.8	14.8	12.	2.8	11.	7.1	.5	.4	.023	3.5	.7	9.7
619	" 24,	"	"	.2	317.2	281.2	36.	18.4	15.6	2.8	10.	6.4	.68	.4	.035	3.5	.95	8.8
655	" 31,	"	"	.3	326.8	293.6	33.2	14.8	14.	.8	10.	7.65	.95	.44	.045	2.75	1.1	8.
684	Apr. 7,	"	"	.2	325.2	303.6	21.6	15.6	11.6	4.	13.	7.3	.75	.46	.075	2.25	.6	7.4
717	" 14,	"	"	.5	358.	298.4	59.6	21.6	14.	7.6	12.	7.6	.7	.44	.11	2.25	1.2	7.5
750	" 21,	"	"	.3	358.	308.8	49.2	20.	14.4	5.6	13.	10.3	.5	.56	.11	1.87	1.35	7.
778	" 28,	decid.	much	m'ddy	504.4	315.2	189.2	24.4	22.	2.4	3.2	13.3	.04	.46	.12	1.25	1.3	7.
804	May 5,	dist'ct	consd.	.3	364.4	333.2	31.2	18.	18.	0.0	13.5	8.9	.45	.44	.275	1.67	1.	6.9
835	" 11,	"	"	.2	360.8	329.2	31.6	20.	12.	8.	14.	9.7	.62	.56	.35	1.75	1.1	5.9
869	" 19,	"	"	.3	374.8	332.	42.8	18.	18.	0.0	15.	9.	1.	.4	.225	1.5	1.2	6.2
899	" 26,	decid.	much	m'ddy	443.6	299.2	144.4	16.8	11.2	5.6	15.	12.5	.45	.56	.375	2.4	......	7.5
935	June 2,	dist'ct	consd.	.7	351.2	271.2	80.	20.4	20.	.4	11.	12.1	.4	.44	.3	2.5	1.1	8.4
963	" 9,	"	"	.2	338.8	282.8	56.	20.	20.	0.0	12.5	10.5	.4	.44	.25	3.25	1.	8.25
990	" 16,	"	"	.2	362.	318.	44.	16.	14.	2.	38.	12.	.5	.56	.2	2.2	1.3	7.6
1025	" 23,	......	......	......	356.	302.	54.	36.	22.	14.	18.	12.7	.5	.4	.2	2.	1.1	6.8
1058	Jun.30,	......	......	......	328.	308.	20.	30.4	20.	10.4	17.	10.2	.52	.4	.25	2.8	1.08	5.3
1080	July 7,	......	......	......	360.	318.	42.	24.	16.8	7.2	20.	13.3	.56	.4	.3	1.3	1.36	4.6
1116	" 14,	......	......	......	372.	324.	48.	22.	18.	4.	23.	13.1	.32	.32	.5	1.1	1.6	3.4
1151	" 21,	......	......	......	320.	292.4	27.6	14.	14.	0.0	20.	10.2	.76	.4	.35	.4	2.8	4.2
1183	" 28,	......	much	......	515.2	277.6	237.6	25.2	20.	5.2	11.	15.2	.01	.62	.09	1.	1.44	6.3
1220	Aug. 4,	dist'ct	"	m'ddy	333.6	249.6	84.	36.	26.	10.	13.	10.4	.22	.4	.175	1.2	.88	8.55
1266	" 11,	"	"	.15	342.4	308.8	33.6	28.4	8.	20.4	16.	10.1	.28	.44	.35	1.4	.8	8.2
1319	" 26,	"	"	.4	344.8	323.6	21.2	9.2	9.2	0.0	18.	13.4	.24	.44	.15	1.7	1.2	6.55
1338	Sep. 1,	"	"	.5	364.8	286.8	78.	20.	14.	6.	18.	14.2	.36	.88	.11	1.3	1.12	5.7
1363	" 9,	"	"	m'ddy	378.8	302.4	76.4	22	21.6	.4	20.	15.3	.44	.5	.08	.95	1.36	4.4
1385	" 15,	"	"	.3	379.6	319.6	60.	13.2	13.2	0.0	23.	13.6	.4	.56	.14	1.7	.96	4.2
1401	" 22,	"	"	.4	381.6	294.8	86.8	15.2	14.	1.2	26.	14.6	.6	.56	.14	1.6	1.20	4.8
1432	" 29,	"	"	.3	348.8	272.	76.8	16.4	6.4	10.	24.	11.1	.8	.64	.125	1.5	.96	4.3
1448	Oct. 6,	"	"	m'ddy	400.	350.4	49.6	22.8	9.6	13.2	28.	12.8	.72	.32	.175	1.5	.96	6.35
1497	" 12,	"	"	"	369.6	316.	53.6	29.6	23.2	6.4	16.	10.6	.28	.36	.125	1.6	1.04	6.95
1536	" 21,	"	"	"	336.	318.	18.	18.	18.	0.0	14.	8.	.32	.44	.055	1.8	1.12	6.3
1562	" 27,	"	"	"	366.	324.	42.	44.	24.	20.	16.	9.8	.28	.58	.04	1.2	.96	5.4
1589	Nov. 4,	"	"	"	340.	310.8	29.2	17.2	17.2	0.0	18.	11.	.56	.32	.04	1.3	.88	5.2
1624	" 10.	"	"	"	342.	322.4	19.6	28.	21.6	6.4	20.	10.5	.76	.52	.03	1.5	.96	5.4
1644	" 18,	"	"	"	364.8	335.6	29.2	22.8	22.	.8	20.	9.3	1.48	.44	.035	1.2	1.2	6.25
1667	" 25,	"	"	"	373.6	348.	25.6	26.	18.	8.	16.	9.4	.68	.36	.05	2.	1.28	6.5
1685	Dec. 2,	"	"	"	362.8	354.4	8.4	12.	9.6	2.4	16.	8.3	.64	.36	.055	2.8	1.2	6.2
1710	" 9,	"	little	"	349.6	348.	1.6	24.4	24.	.4	18.	10.1	.92	.36	.055	1.9	.88	5.9
1732	" 16,	"	"	"	376.	368.4	7.6	20.8	18.8	2.	16.	10.	.92	.4	.025	1.7	.96	5.7
1760	" 23,	"	"	"	355.6	348.	7.6	12.	12.	0.0	16.	11.	1.06	.4	.055	1.4	.96	5.25
1778	" 30,	"	"	.3	364.8	359.2	5.6	16.4	16.	.4	18.	10.	1.32	.36	.035	1.5	.96	4.4

The records kept by the staff of the Biological Experiment Station of the University of Illinois, located at Havana, show that during the year 1896, the water in the Illinois river at Havana was much higher and the current more rapid than they were during the two preceding years. Above, we have given the actual readings from the established gauge, but from these data two units must in each case be substracted, since the low water level has been raised two feet by the construction of dams.

CHEMICAL EXAMINATION OF WATER FROM THE ILLINOIS RIVER AT HAVANA.

(Parts per 1,000,000.)

AVERAGES.

Date of Collection.	Residue on Evaporation. Total.	Dissolved.	Suspended.	Loss on Ignition. Total.	Dis-solved.	Sus-pended.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
Average	404.2	309.9	94.3	21.5	16.7	4.8	15.1	10.9	.63	.49	.134	2.34	1.17
Highest	2896.	394.	2502.	56.	26.	40.	38.	45.	1.48	2.25	.5	6.25	4.75
Lowest	269.6	249.6	1.6	9.2	6.	0.0	1.8	6.4	. 1	.32	.023	.4	.60
OMITTING NO. 525 BECAUSE OF ITS VERY ABNORMAL CONDITION.													
Average	355.3	308.3	47.	21.2	16.4	4.8	15.4	10.3	.63	.455	.135	2.35	1.06
Highest	515.2	368.4	237.6	44.	26.	20.4	38.	15.3	1.48	.88	.5	6.25	2.8
Lowest	269.6	249.6	1 6	9.2	6.	0.0	3.2	6.4	.01	.32	.023	.4	.6
RESULTS OBTAINED BY PROFESSOR J. H. LONG, FOR THE STATE BOARD OF HEALTH ARE AS FOLLOWS:													
May 17, 1888, to Nov. 1, 1888; 24 analyses. Average	301.78	.....	45.4	.....	.....	.....	11.583	8.142	.342	.43	.....	.731	.....
Highest	465.9	.....	274.7	.....	.....	.....	25.842	13.72	.976	.7	.....	2.646	.....
Lowest	243.5	.....	10.5	.....	.....	.....	3.86	3.68	.036	.31	.....	trace	.....
Jan. 14, 1889, to March 11; 9 analyses. Average	352.4	.....	80.8	.....	.....	.....	9.277	9.234	1.078	.585	.....	.414	.....
Highest	477.	.....	289.8	.....	.....	.....	16.496	14.45	1.94	1.008	.....	1.2	.....
Lowest	305.5	.....	13.8	.....	.....	.....	7.43	5.12	.642	.34	.....	trace	.....
During 1894 the following analyses of water from the same point were made at the University:													
May 22,	285.4	.....	.....	89.95	.....	.....	9.5	6.7	.315	.42	none	2.2	.....
July 11,	307.9	.....	.....	107.9	.....	.....	25.7	11.2	.395	.46	much	.6	.....
August 17,	318.8	.....	.....	80.17	.....	.....	39.	6.8	1.945	.63	.....	.06	.....
September 29,	273.6	.....	.....	41.46	.....	.....	23.	6.7	.45	.33	none	2.55	.....
November 12,	316.2	.....	.....	73.5	.....	.....	37.75	6.2	.6	.195	.....	2.6	.....

CHEMICAL EXAMINATION OF WATER FROM THE ILLINOIS RIVER AT KAMPSVILLE.

(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Sediment.	Color.	Residue on Evaporation. Total.	Dissolved.	Suspended.	Loss on Ignition. Total.	Dis-solved.	Sus-pended.	Chlorine.	Oxygen Consumed. Un-filtered.	Filtered.	Nitrogen as Ammonia. Free.	Albuminoid. Total.	Dis-solved.	Sus-pended.	Organic Nitrogen. Total.	Dis-solved.	Sus-pended.	Nitrogen as Nitrites.	Nitrates.
1171	July 23,'96	dist'ct	consd.	md'y	372.4	234.	138.4	18.	18.	0.0	4.2	17 4	7.2	.182	.4	.32	.08	1.2	.88	.32	.064	.55
1190	" 30,	"	"	"	300 8	......	......	32.	......	......	5 9	8 8	......	.04	.4	......	......	.96	......	......	.1	.8
1232	Aug. 7,	"	"	"	294.	222.	72.	21.2	20.	1 2	7.	7.8	......	.036	.36	......	......	.8	......	......	.18	.8
1300	" 18,	"	"	"	420.4	282.8	137.6	26.	4.	22.	13.	11.2	7.5	.036	.56	.56	none	1.12	.96	.16	.13	.9
1311	" 25,	"	little	.2	313.6	274.	39.6	12.	8	4.	13.	8 7	7.7	.004	.48	.32	.16	1.12	.8	.32	.1	2.
1340	Sept. 2,	"	consd.	.6	366.8	288.	78.8	36.	11 2	24.8	14.	13.1	8.8	.084	.56	.4	.16	1.12	.88	.24	.09	1.3
1360	" 8,	"	"	.2	355.6	284.8	70.8	30.	22.	8.	15	11.6	7.8	.096	.64	.464	.176	.88	.68	.2	.085	1.
1383	" 15,	"	"	.2	339.6	298.8	40.8	26.	26.	0.0	15.	10.1	8.1	.088	.4	.328	.072	.96	.88	.08	.065	1.3
1395	" 22,	decid.	much	md'y	378.4	192.4	186.	16.	12.	4.	12	12.9	8.3	08	.56	.32	.24	.96	.66	.3	.068	1.1
1430	" 29,	"	consd.	"	325.6	262.	63.6	10.	10	0.0	18.	10.5	8.2	.136	.32	.296	.024	.8	.72	.08	.045	1.1
1445	Oct. 6,	dist'ct	"	.3	344.	286.	58.	12.8	11.8	1.	17.	10 1	7.9	.136	.64	.48	.16	1.12	.92	.2	.06	1.5
1499	" 13,	decid.	"	md'y	380 8	300.8	80.	26.	14.	12.	14.	11.7	7.9	.18	.64	.4	.24	1.44	1.04	.4	.02	1.7
1535	" 20,	dist'ct	"	"	355 6	302.8	52.8	17.2	17.2	0.0	14.	8.8	7 0	.104	.56	.224	.336	1.28	.72	.56	.06	1.9
1563	" 27,	"	"	"	368.	316.	52.	38.4	16.	22 4	13.	8.	6.3	.056	.8	.24	.56	1.62	.88	.74	.02	1.3
1592	Nov. 3,	"	"	"	338.8	296 8	42.	18.8	13.2	5.6	12.	9.8	7.4	.132	.32	.272	.048	1.28	.56	.72	.024	1.2
1613	" 10,	"	"	"	334.	278.8	55.2	22.	20.	2	13.	10 8	7.7	.332	.56	352	.208	1.04	.56	.48	.035	1.3
1650	" 18,	"	"	"	352.	309.2	42.8	19.2	19.2	0.0	18.	10.	8.5	.644	.56	.44	.12	1.44	1.28	.16	.04	1.6
1670	" 24,	"	little	"	387.2	337.2	50.	52.	13.2	38.8	17.	10 3	6.6	.856	.44	.4	.04	1.76	1.44	.32	.03	1.7
1681	Dec. 1,	"	"	.3	352	337.2	14 8	11.6	11.6	0.0	14.	7 7	6 6	.4	.36	.192	.168	1.6	.88	.72	.065	2.3
1708	" 8,	"	"	md'y	352.8	348.	4 8	18.	18.	0.0	15.	8.5	6 6	.464	.4	.304	.096	1.12	.8	.32	.045	2.2
1731	" 15,	"	consd.	"	355 2	340.4	14.8	16.	16.	0.0	15.	8.5	7.2	.56	.56	.48	.08	1.12	.96	.16	.04	1.6
1758	" 22,	"	little	.15	357 6	350.	7.6	16.8	14.	2.8	15.	7.7	7.	.72	.6	.32	.28	.96	.7	.26	.04	1.4
1781	" 29,	"	"	.3	354.4	353.6	.8	20.	6.	14.	15	9.8	7.5	.656	56	.32	.24	1.28	.8	.48	.03	1.5

AVERAGES.

	Residue Total.	Dissolved.	Suspended.	Loss Total.	Dis-solved.	Sus-pended.	Chlorine.	Un-filtered.	Filtered.	Free.	Alb. Total.	Dis-solved.	Sus-pended.	Org. N Total.	Dis-solved.	Sus-pended.	Nitrites.	Nitrates.
Average	352.1	295.2	59.2	22.4	14.6	7 8	13.4	10.1	7.5	.261	.508	.354	.166	1.17	.93	.34	.062	1.39
Highest	420.4	353.6	186.	52.	26.	38.8	18.	17.4	8 8	.856	.8	.6	.336	1.76	1.44	.74	.18	2.3
Lowest	294.	220.	.8	10.	4.	0.0	4.2	7.7	6.3	.032	.32	.192	.000	.08	.56	.08	.02	.55

CHEMICAL. EXAMINATION OF WATER FROM THE MISSISSIPPI RIVER AT ALTON.
(Parts per 1,000,000)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total.	Residue on Evaporation. Dissolved.	Residue on Evaporation. Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Chlorine.	Oxygen Consumed. Unfiltered.	Oxygen Consumed. Filtered.	Nitrogen as Ammonia. Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.	Total Organic. Total.	Total Organic. Dissolved.	Total Organic. Suspended.	Nitrites.	Nitrates.	Height of river above low water mark.
1114	July 14,	....	... ..	......	314.	212.8	101.2	14.	12 8	1.2	9	12.6	8 8	.016	.32	.28	.4	.96	... ..	......	.02	.7	8.1
1154	" 21,	....	.... ..	......	754.	231.6	522.4	21.2	14 4	6 8	6	0.2	9.3	.034	.96	.4	.56	2.	1.2	.8	.022	.9	10.1
1224	Aug. 4,	decid.	much	md'y	656.8	3 5.6	331.2	30.	6.	24.	11.	15.7	......	.036	.8	.....	.... .	1.92	......	......	.025	.9	10.3
1265	" 11,	"	cons'd.	"	442.	292.	150.	18.	12.4	5.6	10.	12.1	6.	.012	.56	.48	.8	1.12	.64	.48	.015	1.8	9.65
1299	" 18,	"	"	"	655.2	276.	379.2	34.	28.	6.	9.	13.9	7.1	.06	.88	.56	.32	1.44	.8	.64	.03	.8	7.8
1312	" 25,	"	"	.3	496.	260.8	235.2	16	10.4	5 6	11	14.4	6.8	.006	.4	.32	.08	1.44	.64	.8	.05	.8	5.4
1341	Sept. 1,	dist'ct	"	.3	434.8	238.8	196.	30.	14.	16.	11.	12 4	7.9	.056	72	.52	.2	1.12	.8	.32	.001	.9	6.6
1361	" 8,	"	"	md'y	396.	240 8	155.2	16.	12.	4.	10	13 2	8 3	.024	.68	412	.268	.96	.6	.36	.03	.75	4.1
1384	" 15,	"	"	"	380.8	237.6	143.2	24.	14.	10.	9	11.9	6.6	.012	.48	.3	.18	.8	.56	.24	.06	.9	2.5
1404	" 23,	decid.	much	"	522.	171.6	350.4	10.	10.	0.0	5.8	16 1	7.2	.028	.56	.32	.24	2.08	.8	1.28	.08	1.	2.5
1429	" 29,	"	"	"	470.8	209.6	261.2	9.2	5.6	3 6	11.	14 3	7	.032	.64	.42	.22	1.12	.8	.32	.015	.8	6.5
1451	Oct. 6,	"	"	"	972.	226.	746.	25.2	16.	9.2	12.	24.4	6.6	.02	1 28	.24	1 04	2.4	.4	2.	.001	1.1	4.2
1498	" 13,	"	cons'd.	"	403.2	262.4	140.8	22 4	22.4	0.0	15.	11 8	7.9	.018	.56	.4	.16	1.44	1.04	.4	.017	.9	3.3
1534	" 20,	"	"	"	455.2	256.8	198.4	18.4	18.4	0 0	10	11 1	6.	.012	.72	.112	.608	1.6	.64	.96	.036	1.1	3.05
1564	" 27,	dist'ct	"	"	368.	249.2	118.8	21 6	19.2	2.4	9	9.9	6.2	.028	.64	.42	.22	.96	.72	.24	none	.6	2.8
1591	Nov. 3,	"	"	"	347.6	240.8	106 8	14.4	14.	0.4	9.	10 3	6.3	.012	.24	.192	.048	1.28	.4	.88	none	.5	2.1
1614	" 10,	"	"	"	372.	220.8	151.2	20.	12.	8	9.	12.	6 8	.072	.408	32	.088	1.12	.72	.4	.021	.9	3.3
1642	" 17,	"	"	"	312.4	248.4	94.	20.8	15.6	5.2	10.	10.8	5.6	.164	.4	.32	.08	1.28	1.12	.16	.025	1.1	3.8
1669	" 24,	"	"	"	280.	231.2	48.8	18.	18.	0 0	10.	13.2	8.1	.316	.4	.36	.04	1.6	1.28	.32	.027	1.3	3.95
1680	Dec. 1,	"	"	"	286	246.4	39.6	12.	12.	0.0	8	8 4	8.2	.108	.32	.192	.128	1.28	1.04	.24	.05	1.1	4.2
1709	" 9,	"	little	"	280 4	260.	20.4	10.8	10.8	0 0	9.	10.4	7.1	.12	.4	.208	.192	1 12	72	.4	.02	1.1	3.
1730	" 15,	"	"	"	305 6	288.8	16.8	21.2	21.2	0.0	8.6	7.7	7	.136	.64	.44	.2	1.12	.88	.24	.02	1.2	3.5
1764	" 23,	"	cons'd.	"	258.4	203.6	54 8	13.2	8.8	4.4	8.	15 7	12.7	.208	.4	.28	.12	1.12	.48	.64	.03	1.2	5.6
1777	" 27,	"	"	8	233.2	217.6	15 6	14.	12.	2.	7.	13	12 4	144	.304	.24	.061	1.12	.72	.4	.017	.9	4.45

AVERAGES.

	Residue Total	Dissolved	Suspended	Loss Total	Loss Dissolved	Loss Suspended	Chlorine	Oxygen Unfiltered	Oxygen Filtered	Free	Alb. Total	Alb. Dissolved	Alb. Suspended	Org. Total	Org. Dissolved	Org. Suspended	Nitrites	Nitrates	Height
Average. ....,....	434.4	243.7	190.7	18.9	14.	4.7	9.5	13.1	7.6	.069	.571	.335	.226	1.3	.69	.52	.025	.97	......
Highest ... ,........	972.	325.3	746.	30.	22.4	24.	15.	24.4	12.7	.316	1.28	.44	1.04	2.4	1.28	2.	.08	1.8	......
Lowest............	233.2	171.6	15.6	9.2	5.6	0.	5.8	7.7	6.	.006	.24	.112	.04	.8	.4	.16	.0 0	.5	.. ...

THE RESULTS OF ANALYSES OF WATER PROM THE SAME SOURCES MADE BY PROFESSOR J. H. LONG FOR THE STATE BOARD OF HEALTH ARE AS FOLLOWS :

		Residue Total	Dissolved	Suspended	Loss Total	Loss Dissolved	Loss Suspended	Chlorine	Oxygen Unfiltered	Oxygen Filtered	Free	Alb. Total	Alb. Dissolved	Alb. Suspended	Org. Total	Org. Dissolved	Org. Suspended	Nitrites	Nitrates	Height
1888— July 19 to Nov. 1. 15 analyses.	Average..	278.6	......	75.2	......	......	......	4.08	7.35	.. ...	.055	.356	......	......	......	......	......	.... .	......	......
	Highest ..	408.	......	217.4	......	......	......	6.72	11.52	......	.134	.478	......	......	......	......	......	......	1.26	......
	Lowest....	218.5	......	19.8	......	......	. ..	1.29	4.96	......	.004	.202	......	... .	......	......	......	.. ...	.31	......
1889— Jan. 14 to Mar. 4.	Average..	309.9	......	61.3	......	......	......	5.834	7.562	......	.422	.396	......	......	......	......	.. ..	......	.317	......
	Highest ..	402.	......	234.5	......	... ..	......	86.14	15.2	......	.518	.651	......	......	......	......	......	......	1.008	......
	Lowest ..	123.3	......	16.	. .	.	......	4 062	5.12	......	.316	.251	....	......	......	......	......	.....	tr'c	......

CHEMICAL EXAMINATION OF WATER FROM THE MISSISSIPPI RIVER AT QUINCY.
(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total.	Residue on Evaporation. Dissolved.	Residue on Evaporation. Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Chlorine.	Oxygen Consumed.	Nitrogen as Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
71	Oct. 14,'95	....	....	......	190.	......	......	28.8	....	....	1.6	14.5	.02	.464	none	.1	......
168	Nov. 6,	....	....	......	162.2	......	......	3.6	....	....	3.3	8.2	.01	.168	"	.24	......
242	Dec. 2,	....	....	....	198.6	......	......	3.2	....	....	3.8	7.6	.037	.512	"	.14	.. ...
574	Mar.11,'96	....	....	......	226.4	......	......	12.4	....	....	2.9	7.8	......	......	.09	2.3	......
1129	July 16,	decid'd	consid.	......	209.2	161.5	47.7	20.	20.	none	1.85	11.3	.046	.48	none	.15	......
1172	" 24,	"	"	......	218.	174.8	43.2	18.	18.	"	1.8	12.2	.024	.36	.001	.2	......
1204	" 30,	"	"	......	226.4	150.4	76.	20.	16.	4.	1.9	12.5	.052	.4	.001	.1	......
1230	Aug. 6,	great	v. m'ch	......	449.6	213.6	236.	21.2	20.8	.4	2.2	15.2	.02	.56	.04	.5	......
1285	" 14,	disti'ct	consid.	......	236.	207.6	28.4	8.	7.8	.2	2.6	11.2	.024	.4	.36	.45	......

CHEMICAL EXAMINATION OF WATER FROM THE MISSISSIPPI RIVER AT GOLDEN EAGLE.

(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total Residue. Total.	Total Residue. Dissolved.	Total Residue. Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Oxygen Consumed. Unfiltered.	Oxygen Consumed. Filtered.	Chlorine.	Nitrogen as Ammonia. Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.	Organic Nitrogen. Total.	Organic Nitrogen. Dissolved.	Organic Nitrogen. Suspended.	Nitrogen as Nitrites.	Nitrogen as Nitrates.
1261	Aug. 10,'96	decid.	much	md'y	468.	218.	250.	22.	20.	.2	15.6	......	6.	.032	.96	......	......	1.76	......	......	.05	.9
1287	" 17,	dist'ct	consd.	.3	248.	212 8	35.2	11.2	11.2	0.0	11.5	......	3.1	.056	.64	......	......	1.28	......	......	.001	.6
1322	" 28,	"	"	md'y	346.8	165.6	181.2	8.	8.	0.0	12.5	......	5.	.012	.8	......	......	1.12	......	......	.055	.32
1357	Sept. 7,	"	"	.2	264.8	182.8	82.	20.	16.	4.	11.6	7.	4.4	.028	.48	.4	.08	.8	.8	none	.048	.6
1378	" 14,	"	"	.2	236.	170.	66.	12.	8.	4.	10.4	8.1	4.	.08	.44	.44	.000	.88	.88	"	none	.1
1396	" 21,	much	much	md'y	486.8	143.6	343.2	14.	7.6	6.4	14.4	6 7	4.2	.015	.72	.16	.56	1.28	.604	.596	.045	.4
1441	Oct. 3,	"	consd.	"	250.4	168	92.4	11.2	11.2	0.0	9.7	5.6	4 5	.014	.56	.128	.432	.8	.32	.48	.004	.32
1475	" 7,	"	"	"	250.8	156.	94.8	17.6	8.	9.6	9 2	5.4	4 2	.008	.4	.104	.296	1.12	.12	1.	.001	.075
1500	" 13,	"	"	"	250.	183.2	66.8	19.2	12.	7.2	10.4	5.8	5.2	.016	.64	.32	.32	1.36	.88	.48	.008	.1
1532	" 19,	decid.	"	"	241.2	178.	63.[illegible]	16.	11.6	4.6	10.	6.1	4.	.016	.56	.176	.384	1.76	.72	1.04	.007	.1
1633	Nov. 13,	"	"	"	238.	189.6	48 4	14.	14.	0.0	10.	6.4	4.	.028	.48	.272	.208	1.28	.96	.32	.014	.55
1651	" 19,	"	"	"	220.	189.2	30.8	14.4	14.4	0 0	7.7	7.	3.6	.02	.48	.16	.32	1.44	1.04	.4	.03	.32
1694	Dec. 4,	"	"	"	244.	193.	51.	16.	14.	2.	12.7	8.3	5.	.036	.56	.32	.24	1.28	.8	.48	.001	.6
1756	" 19,	"	"	"	250.	156.	94.	20.4	16.8	3.6	14.5	12.1	2.8	.064	.56	.44	.12	1 12	.48	.64	.03	.8
1757	" 21,	"	"	"	205.2	138.	67.2	18.	18.	0 0	17.5	16.9	2.4	.036	.56	.4	.12	.88	.72	.16	.006	.44
AVERAGES:																						
Average					280.6	176.2	104.4	15.6	12.7	2.9	11.8	7.9	4.1	.03	.589	.276	.257	1.21	.693	.466	.02	.408
Highest					486 8	218.	343.2	22.	20.	9.6	17.5	16.9	6.	.08	.96	.44	.56	1.76	1.04	1.04	.055	.9
Lowest					205 2	143.6	30.8	8.	8.	0.0	7.7	5.4	2.4	.012	.4	.028	.000	.8	.12	.16	.005	.1

The examinations of water from the Mississippi river at this point are made for the purpose of comparison with the water taken from the Mississippi at Alton, and constitute part of an investigation of the influence of the discharge from the Illinois river upon the waters of the Mississippi.

CHEMICAL EXAMINATION OF CERTAIN SAMPLES OF WATER FROM LAKE MICHIGAN, COLLECTED FROM TAP AT 465 STATE STREET, CHICAGO.

(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total.	Dissolved.	Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Chlorine.	Oxygen Consumed. Unfiltered.	Oxygen Consumed. Filtered.	Nitrogen as Ammonia. Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.	Organic Nitrogen. Total.	Organic Nitrogen. Dissolved.	Organic Nitrogen. Suspended.	Nitrogen as Nitrites.	Nitrogen as Nitrates.
991	June 16,'96	slight	little	.01	144.4	......	.....	10.4	......	......	3.1	2.5	......	.01	.066	......	......	......	......	......	.000	.1
996	" 17,	"	"	.01	134.	......	......	6.	......	......	2.9	2.	......	.008	.06	......	......	.....	......	......	.000	.22
1005	" 19,	"	"	.01	140.	......	......	8.	......	......	3.1	2.3	......	.008	.07	......	......	......	......	......	.000	.14
1006	" 19,	"	"	.01	138.	......	......	12.	......	......	3.	2.	.....	.004	.062	......	......	......	......	......	.000	.072
1105	July 13,	"	"	01	140.8	......	......	10.	......	......	3.	2.2	......	.006	.088	......	.....	......	......	......	.000	.14
1109	" 14,	"	"	.01	136.	.....	.....	6.	......	......	3.1	1.7	......	.002	.076	......	......	.....	......	......	.000	.06
1274	Aug. 13,	decid.	"	.03	227.2	172.4	54.8	44.	27.	17.	3.	1.8	......	.004	.092	.....	......	.260	.....	......	.000	.1
1440	Oct. 5,	none	none	.03	140.	140.	0.0	8.	8.	0.0	3 2	2.3	.....	.002	.082	......	......	.232	......	......	.000	.096
1474	" 8,	slight	little	.02	149.2	......	......	33.2	......	......	2.9	2.2	......	.002	.088	......	......	.264	......	......	.000	.2
1679	Dec. 1,	"	"	.03	144.	139.6	4.4	6.	4 8	1.2	3 5	3.	2.7	.002	.136	.072	.064	.72	.6	.12	.001	.28
1702	" 7,	"	"	.04	142.	131.2	10.8	8.	8.	0.0	3.6	2.6	2.1	006	.088	.08	.008	.72	......	......	.001	.17
1722	" 14,	"	"	.03	146.4	140 4	6.	11.2	10.8	.4	3.6	3.1	2.1	.008	.176	.096	.08	.64	.52	.12	.001	.052
1755	" 21,	"	"	.06	145.2	137.6	7.6	8.	6.	2.	3.1	4.3	3.3	.006	.12	.096	.024	.48	.176	.304	.000	.2
1766	" 26.	"	"	04	140.4	132.8	7.6	6.	4.	2.	3.	2 9	2.5	.003	.08	56	.024	.176	.16	.016	.001	.15
AVERAGES.																						
Average					147.7	142.	13.	12.6	9.8	3.22	3.15	2.49	2 54	.0049	.0917	.08	.04	.471	.364	.14	.0002	.141
Highest					227.2	172.4	54.8	44.	27.	17.	3.6	4.3	3.3	.01	.176	.096	.08	.72	.6	.304	.001	.28
Lowest					134.	131.2	0.0	6.	4.	0.0	2.9	1.7	2.1	.002	.06	.056	.008	.176	.16	.016	.000	.052

These analyses of Lake Michigan water were made in connection with our study of the pollution of the Illinois River with Chicago sewage.

CHEMICAL EXAMINATION OV WATER FROM QUIVER LAKE, NEAR HAVANA.

(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance.			Residue in Evaporation.			Chlorine.	Oxygen Consumed.	Nitrogen as				
		Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.			Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
19	Sept. 24,'95	consid.	consid.	....	284.2	21.6	262.6	2.1	2.45	.122	.118	.02	.399	......
33	Oct. 1,	slight	....	....	254.6	29.2	225.4	2.45	2.15	.08	.132	.001	.28	......
53	" 8,	....	little	....	249.6	20.	229.6	1.8	1.6	.03	.056	......	.12	......
73	" 15,	....	"	....	256.6	14.8	241.8	2.2	1.4	.024	.088	......	.22	......
105	" 23,	....	....	....	244.2	15.4	228.8	2.	1.5	.016	.06	......	.084	......
130	" 29,	....	little	....	250.	5.2	244.8	1.75	1.25	.02	.082	......	.2	......
163	Nov. 5,	slight	"	....	234.	25.2	208.8	2.3	1.6	.03	.144	......	.14	......
191	" 11,	....	....	....	242.2	22.2	220.	2.3	1.25	.014	.064	.001	.42	......
207	" 19,	....	little	....	236.	22.	214.	1.9	1.35	.036	.096	.004	.28	......
227	" 27,	slight	"	....	226.4	6.4	220.	1.8	1.1	.008	.062	.002	.3	......
239	Dec. 3,	"	"	....	306.6	7.2	299.4	2.5	1.6	.008	.072	.02	2.8	......

AVERAGES.

	Total.	Loss on Ignition.	Fixed.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
Average	253.1	17.2	235.9	2.1	1.57	.035	.089	......	.477	......
Highest	306.2	29.2	299.4	2.5	2.45	.122	.144	......	2.8	......
Lowest	226.4	5.2	208.8	1.8	1.1	.008	.056	......	.84	......

The examinations of the water from Quiver Lake were made primarily on behalf of the Biological Experiment Station of the University. During the period covered by the analyses the lake was fed almost exclusively by Quiver Creek, and the data may be regarded as characteristic of the waters of some of the smaller, uncontaminated streams of the State.

CHEMICAL EXAMINATION OF WATER FROM BIG VERMILION RIVER AT LA SALLE.

(Parts per 1,000,000.)

Number.	Date of Collection.	Residue on Evaporation.						Chlorine.	Oxygen Consumed.	Nitrogen as				
		Total.	Dissolved.	Suspended.	Loss on Ignition.					Free Ammonia.	Albuminoid Ammonia.	Total Organic.	Nitrites.	Nitrates.
					Total.	Dis-solved.	Sus-pended.							
384	Jan. 9,'96	416.8	....	....	23.2	....	....	8.	.5	*	....	....	.002	7.5
405	" 20,	466.	454.8	11.2	37.6	35.6	2.	11.	2.5	....	....	....	.035	6.75
432	" 27,	304.	276.8	27.2	20.	18.	2.	4.2	6.9	....	....	....	.02	7.
473	Feb. 7,	360.4	298.	62.4	25.2	25.2	0.0	3.7	6.5	....	....	....	.02	6.5
494	" 17,	383.6	378.	5.6	24.	20.	4.	6.3	1.9	....	....	....	.025	5.2
515	" 24,	372.8	263.3	109.5	26.	16.8	9.2	4.	11.5	....	....	....	.02	2.75
538	Mar. 2,	335.6	327.2	8.4	29.6	28.	1.6	4.2	2.9	....	....	....	.025	7.5
586	" 17,	388.	384.	4.	26.8	26.8	0.0	7.	2.	....	....	....	.027	6.75
635	" 25,	387.6	378.4	9.2	27.	17.6	9.4	10.	1.3	....	....	....	.025	7.
677	Apr. 6,	471.6	416.	55.6	28.8	24.4	4.4	10.3	4.7	....	....	....	.035	6.25
707	" 14,	358.	298.4	59.6	21.6	14.	7.6	12.	7.6	....	....	....	.11	2.25
745	" 20,	412.	408.	4.	32.4	32.4	0.0	14.	2.9	....	....	....	.06	5.25
772	" 27,	420.	368.4	51.6	44.	38.4	5.6	6.5	3.9	....	....	....	.03	4.75
801	May 4,	402.	....	....	33.6	....	....	9.4	2.5	....	....	....	.045	5.5
829	" 13,	404.	402.	2.	26.	26.	0.0	10.7	1.9	....	....	....	.04	3.25
859	" 18,	832.8	338.8	494.	26.	18.	8.	6.2	17.2	....	....	....	.105	2.7
894	" 25,	423.2	314.	109.2	32.	16.	16.	3.9	6.6	.141	.36	.9	.055	4.75
928	June 1.	392.	382.4	9.6	25.2	25.2	0.0	8.5	3.5	.008	.2	.5	.035	5.75
960	" 10,	422.8	400.	22.8	38.	28.	10.	13.	3.8	.015	.18	.7	.03	4.1
992	" 19,	380.	360.	20.	36.	24.	12.	9.	4.6	.04	.3	.8	.035	3.75
1015	" 22,	432.	414.	18.	42.	34.	8.	10.9	3.4	.02	.16	1.	.02	4.
1051	" 29,	416.	408.	8.	32.8	30.	2.8	16.	3.6	.036	.2	.52	.024	4.
1077	July 8,	490.8	482.	8.8	32.8	32.	.8	25.	3.2	.04	.24	.38	.02	3.4
1103	" 13	598.	562.	36.	28.	26.	2.	46.	2.4	.036	.3	.44	016	2.4
1140	" 22,	574.8	562.	12.8	25.4	25.4	0.0	42.	3.7	.034	.2	.48	.012	0.9
1185	" 30,	334.4	308.	26.4	30.	32.	2.	4.	7.5	.032	.24	.6	.07	3.5
1219	Aug. 3,	331.	328.	3.	34.	31.2	2.8	57.	6.8	.032	.33	.96	.01	2.3

AVERAGES.

	Total.	Dissolved.	Suspended.	Loss on Ignition Total.	Dis-solved.	Sus-pended.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Total Organic.	Nitrites.	Nitrates.
Average	427.6	380.5	47.1	31.1	25.7	4.4	11.9	4.91	.03	.245	.661	.035	4.65
Highest	832.8	562.	494.	44.	38.4	16.	46.	17.2	.041	.36	1.	.11	7.5
Lowest	331.	263.3	2.	20.	14.	0.0	3.7	1.3	.008	.16	.38	.002	.9

*Blank spaces in this table are due to the loss of records by fire.

CHEMICAL EXAMINATION OF WATER FROM THE ILLINOIS AND MICHIGAN CANAL AT LOCKPORT.
(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total.	Residue on Evaporation. Dissolved.	Residue on Evaporation. Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Chlorine.	Oxygen Consumed. Unfiltered.	Oxygen Consumed. Filtered.	Nitrogen as Ammonia. Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.	Total Organic. Total.	Total Organic. Dissolved.	Total Organic. Suspended.	Nitrites.	Nitrates.
524	Feb. 25,'96	dec'd'd	consid.	m'dy	659.2	596.	63 2	51 2	32.4	18.8	137.	32.4	......	14.	3 5	......	......	5.5	......	......	.035	.3
541	Mar. 2,	"	"	"	617.6	573 2	44 4	52.8	46 4	6.4	79.	28 7	......	8.7	3 5	......	......	6.5	......	......	none	.15
559	" 9,	"	"	"	689.2	643.2	46.	48.8	41.2	7.6	108.	35.	......	9.5	4 1	......	......	5.75	......	......	.014	.15
584	" 16,	"	"	"	563.2	479.6	83 6	55.2	17 6	37.6	74.	32.7	......	10.5	3 2	......	....	6.25	......	......	.03	.15
616	" 23,	"	"	"	571 2	550.4	20.8	46.8	44.4	2.4	83.	35.1	......	11.	3 2	......	......	6.	......	......	.005	.25
656	" 30,	"	"	"	664.4	......	......	47.2	....	......	124.	35.	... .	17.	2.8	......	......	5.25	......	......	.006	.1
688	April 6,	"	"	"	559 2	......	......	40.	......	......	80.	34.5	......	11.	2.	......	......	2.75	......	......	none	.25
726	" 15,	"	"	"	554.4	518.8	35 6	36.8	26.8	10.	82.	36.4	......	14.	2.2	......	......	3 75	......	......	"	.12
769	" 24,	"	"	"	612.4	530.	82.4	59.6	34.	25.6	71.	36.6	......	12.	2.	......	......	5 5	......	......	.001	.15
812	May 4,	"	"	"	720.	522.	198.	54.	41.2	12.8	95.	48.5	......	16.	2.8	......	......	4.5	......	......	001	.2
839	" 11,	"	"	"	609.6	472	137.6	52.	40.	12.	91.	38 1	......	16.	1.2	......	......	10.	......	.....	none	.5
867	" 18,	"	"	"	670.8	493.6	177.2	66 8	32 8	34.	106.	32 5	......	16.5	3.36	......	......	6 75	......	.....	.045	.2
905	" 26,	"	"	"	638.	476.	162	42.	30.	12.	81.	27.7	......	11.	1.6	......	......	3.75	......	......	.004	.175
931	June 1,	"	"	"	1224 8	1110.	114 8	70.	52.	18.	370.	55.	......	36.	3.	......	......	6.5	......	......	.001	.3
966	" 9,	"	"	"	1472.	1173.2	298.8	116.	72.	44.	405.	68.6	......	49.	2.8	......	......	7.	......	......	none	.25
986	" 16,	"	"	"	706.	540 8	165.2	48.8	20.	28.8	99.	49.6	......	15.	1.5	......	......	6.	......	......	.001	.15
1030	" 23,	"	"	"	550.	484.8	65.2	41.6	28.4	13.2	97.	70.	......	14.	2.	......	......	3.5	......	.. ..	.018	.2
1089	July 7,	"	"	"	428.	382.	46.	30.	28.	2.	76.	29.	......	12.	2.	......	......	3.	......	......	.005	.1
1117	" 14,	"	"	"	612.	428.	184.	54.	33 6	20.4	92.	37.8	15.6	14.4	2.4	1.	1.4	2.8	1 4	1.4	none	.2
1163	" 21,	"	"	"	572.4	460.8	111 6	37.2	28.	9.2	109.	35.8	15.	18.8	2.	1.44	.56	4.4	2.88	1.52	"	.18
1188	" 28,	"	"	"	1134.8	839 2	295 6	60.	29.2	30.8	240.	47 5	......	22.4	2 8	1.44	1.36	6.4	2.4	4.	"	.5
1223	Aug. 3,	"	"	"	532.8	394.4	138 4	33.2	18.	15.2	107.	35.8	11 7	16.	1.8	1.12	.68	3.52	2.24	1.28	"	.2
1262	" 11,	"	"	"	504.8	242.6	262 8	36	9.2	16.8	89.	33.5	13 8	14 4	1.28	1.2	.08	2.8	2.4	.4	"	.3
1302	" 18,	"	"	"	564.	517.6	46.4	26.	16.	10.	121.	38.7	13 6	14.4	1.4	1.3	.1	2.88	2 24	.64	"	.3
1317	" 25,	"	"	"	470.	430.	40	20.	11.6	8.4	90.	32 5	13 6	12	1.6	.48	1 12	2.88	.96	1.92	.02	.2
1337	Sept. 1.	"	"	"	604.8	391.6	213.2	34.	25.	9.	73.	32 5	14 8	11.2	2.4	1.76	.64	4.88	2.88	1.6	.06	.25
1354	" 7,	"	"	"	562.4	443 6	118 8	40.	18.	22.	98.	28.5	14.4	13.6	2.24	1.6	.64	4.16	2.56	1.6	.001	.15
1375	" 14,	"	"	"	477.6	442 8	34 8	18.	18.	0.0	100.	28 4	11.2	16.	2.24	.8	1.44	3.36	1 76	1.6	none	.25
1399	" 21,	"	"	"	840 8	587.2	253 6	42.	24.8	17.2	122.	56.1	14 6	15.2	3.52	1 6	1.92	7 6	3.2	4.4	"	.25
1424	" 28,	"	"	"	610.	426.	184.	50.	18.	32.	96.	46 3	12.	12.	3.04	.64	2.4	5.12	1.36	3.76	"	.15
1452	Oct. 6,	"	"	"	586.	500.8	85.2	42.	42.	0 0	83.	35.1	13 8	10.4	2.56	.64	1.92	4 32	1.44	2.88	"	.1
1504	" 13,	"	"	"	542.	476	46.	48.	25.	23.	105.	31 5	11.9	13 6	2 08	.96	1.12	3 84	1.6	2.24	"	.25
1538	" 20,	"	"	"	710.	465.6	244.4	61.2	20.	41.2	104.	38.5	14.	15.2	3.04	.96	2 08	6 8	1.6	5.2	.001	.075
1573	" 29,	"	"	"	514.	431.2	72.8	34.	26.	8.	103.	36.	14.2	13.6	2 2	.8	1.4	4.4	1.44	2.96	.004	.05
1587	Nov. 3,	"	"	"	591.2	435.2	156.	47.2	18.	29.2	95.	39.	12.9	16.	2.56	1.04	1.52	5.2	1.6	3.6	none	.1

CHEMICAL EXAMINATION OF WATER FROM THE ILLINOIS AND MICHIGAN CANAL AT LOCKPORT.—*Continued.*
(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance. Turbidity.	Appearance. Sediment.	Appearance. Color.	Residue on Evaporation. Total.	Residue on Evaporation. Dissolved.	Residue on Evaporation. Suspended.	Loss on Ignition. Total.	Loss on Ignition. Dissolved.	Loss on Ignition. Suspended.	Chlorine.	Oxygen Consumed. Unfiltered.	Oxygen Consumed. Filtered.	Nitrogen as Ammonia. Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.	Total Organic. Total.	Total Organic. Dissolved.	Total Organic. Suspended.	Nitrites.	Nitrates.
1625	Nov. 10,	dec'd'd	consid.	m'dy	730.8	606.8	124.	74.	33.2	40.8	114.	45.	16.1	12.	3.84	1.2	2.64	7.2	2.4	4.8	none	.12
1649	" 17,	"	"	"	620.	501.6	118.4	36.	30.	6.	86.	38.4	16.9	10.4	2.96	1.28	1.68	5.6	2.96	2.64	"	.2
1665	" 24,	"	"	"	772.8	650.	122.8	40.8	36.8	4.	160.	43.8	16.	20.8	3.04	1.28	1.76	6.8	2.72	4.8	"	.15
1683	" 31,	"	"	"	697.6	6 6.	71.6	66.8	24.	42.8	144.	44.8	16.9	11.2	2.56	1.12	1.44	7.4	2.08	5.32	.001	.15
1704	Dec. 7,	"	"	"	634.	553.6	80.4	54.	31.6	22.4	137.	45.5	15.5	11.2	3.2	.96	2.24	6.4	2.4	4.	.02	.15
1727	" 14,	"	"	"	514.	468.	46.	58.	32.	26.	100.	36.	16.	10.4	2.56	1.28	1.28	4.8	2.24	2.56	none	.15
1763	" 21,	"	"	"	628.8	572.8	56.	50.4	19.2	31.2	149.	38.2	23.5	16.	3.2	1.76	1.44	5.6	2.88	2.72	.006	.3
1787	" 29.	"	"	"	454.	428.4	25.6	40.	28.	12.	85.	37.7	17.9	10.4	2.56	1.76	.8	5.6	3.2	2.4	.014	.06

AVERAGES.

	Residue Total	Dissolved	Suspended	Loss Total	Loss Dissolved	Loss Suspended	Chlorine	O. C. Unfiltered	O. C. Filtered	Free	Alb. Total	Alb. Dissolved	Alb. Suspended	T. O. Total	T. O. Dissolved	T. O. Suspended	Nitrites	Nitrates
Average.........................	650.4	533.2	118.8	47.9	29.7	18.5	119.1	39.2	14.7	14.99	2.55	1.17	1.34	5.17	2.19	2.84	.007	......
Highest............................	1472.	1173.2	298.8	116.	72.	44.	405.	70.	23.5	49.	4.1	1.76	2.64	10.	3.2	5.32	.06	.....
Lowest............................	428.	242.	20.8	20.	9.2	0.0	71.	27.7	11.2	8.7	1.2	.64	.08	2.75	.96	.4	.000	.05

THE RESULTS OF ANALYSES OF THE SAME WATER MADE BY PROFESSOR J. H. LONG FOR THE STATE BOARD OF HEALTH, ARE AS FOLLOWS:

		Residue Total	Dissolved	Suspended	Loss Total	Loss Dissolved	Loss Suspended	Chlorine	O. C. Unfiltered	O. C. Filtered	Free	Alb. Total	Alb. Dissolved	Alb. Suspended	T. O. Total	T. O. Dissolved	T. O. Suspended	Nitrites	Nitrates
1888— May 3 to Oct. 30. 24 analyses.	Average.......	431.2	......	69.8	......	......	......	46.12	16.23	.....	10.88	1.99	......	......	......	......	......	......	0.00
	Highest	699.	......	242.	...	...	......	121.77	25.12	......	19.04	3.56	......	......	......	......	......	......	0.00
	Lowest	312.4	......	30.8	......	......	......	12.7	6.88	......	6.38	1.18	....	.....	......	......	......	... ..	0.00
1889— Jan. 14 to Mar. 4. 8 analyses.	Average.......	408.6	......	24.6	......	......	......	56.08	22.82	......	8.149	2.489	....	.....	.....	.....	......	......	000
	Highest.......	544.	......	54.9	......	......	......	73.63	29.28	......	11.015	3.4	......	......	......	......	......	......	000
	Lowest	292.	......	13.1	......	......	......	40.71	17.56	......	5.3	1.96	......	......	......	......	....	......	000

It is evident that the canal now carries much more sewage than it did at the time the investigations were made by the State Board of Health.

CHEMICAL EXAMINATION OF WATER FROM SPOON RIVER AT HAVANA.
(Parts per 1,000,000.)

Number.	Date of Collection.	Appearance.			Residue on Evaporation.						Chlorine.	Oxygen Consumed.	Nitrogen as				
								Loss on Ignition.									
		Turbidity.	Sediment.	Color.	Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.			Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
499	Feb. 18,'96	......	......	......	324.4	......	......	13.2	......	......	3.8	2.8	......	......	.02	2.	......
511	" 21,	......	......	......	324.	305.2	18.8	21.6	20.	1.6	11.	6.8	*	......	.05	4.5	......
526	" 25,	......	......	......	507.2	300.	207.2	16.8	8.8	8.	6.3	13.6	......	......	.04	3.5	......
539	Mar. 3,	......	......	......	346.4	290.	56.4	12.8	12.8	0.0	3.	4.8	......	......	.035	3.75	......
562	" 10,	......	......	......	312.4	305.2	7.2	18.8	17.6	1.2	2.9	2.4	......	......	.02	2.8	......
588	" 17,	......	......	......	307.2	302.8	4.4	18.8	13.2	5.6	3.7	3.	......	......	.02	2.5	......
618	" 24,	......	......	......	316.4	308.	8.4	14.4	14.	.4	4.	1.6	......	......	.02	6.	......
654	" 31,	......	......	......	305.6	296.8	8.8	14.	14.	0.0	3.7	3.3	......	......	.01	1.75	......
683	Ap'l 7,	......	......	......	284.4	268.8	15.6	16.8	12.	4.8	4.1	4.3	......	......	.18	.3	......
716	" 14,	......	......	......	526.8	292.	234.8	22.8	20.	2.8	3.4	8.3	......	......	.005	3.25	......
749	" 21,	......	......	......	339.6	302.4	37.2	14.	11.2	2.8	4.	5.2	......	......	.03	2.25	......
779	" 28,	......	......	......	504.4	315.2	189.2	24.4	22.	2.4	3.2	13.3	......	......	.12	1.5	......
803	May 5,	......	......	......	337.6	......	......	18.	18.	0.0	3.7	4.1	......	......	.04	1.5	......
834	" 12,	......	......	......	308.4	262.4	46.	12.	12.	0.0	6.	6.7	......	......	.03	.7	......
868	" 19,	......	......	......	241.2	......	......	6.2	6.2	0.0	2.5	2.9	......	......	.11	1.25	......
900	" 26,	......	......	......	414.	......	......	15.2	15.2	0.0	2.2	12.1	.014	.48	.17	2.3	.7
934	June 2,	dist'ct	consd.	.15	353.2	324.8	28.4	21.6	16.8	4.8	3.8	4.8	.024	.256	.04	2.75	.6
962	" 9,	decid.	much	mud'y	682.	378.	304.	18.	14.	4.	2.7	12.8	.128	.52	.095	1.7	1.4
989	" 16,	dist'ct	little.	.1	296.	268.	28.	20.	14.	6.	2.5	8.3	.1	.1	.03	1.3	......
1026	" 23,	......	......	......	262.	254.	8.	12.	12.	0.0	3.9	8.7	.9	.4	.045	1.25	.8
1057	" 30,	......	......	......	244.4	228.	16.4	22.4	22.4	0.0	4.5	6.6	.016	.44	.000	.12	1.08
1079	July 7,	......	......	......	336.8	236.	100.8	10.	10.	0.0	2.1	9.5	.172	.44	.075	1.4	1.44
1115	" 14,	......	......	......	292.	258.	34.	16.	8.	8.	2.	8.	.127	.4	.001	2.	.88
1152	" 21,	......	......	......	475.6	250.	225.6	26.8	8.4	18.4	2.5	19.6	.212	.48	.037	.6	1.2
1182	" 28,	......	......	......	364.	323.2	40.8	24.	16.	8.	23.	12.2	.36	.56	.125	.95	.86
1221	Aug. 4,	decid.	much	mud'y	333.6	249.6	84.	36.	26.	10.	13.	10.4	.22	.4	.175	1.2	.88
1267	Aug 11,	dist'ct	little	.3	286.	267.2	18.8	22.	12.4	9.6	5.8	8.6	.022	.4	.1	1.	.88
1320	" 26,	"	"	.1	310.	300.4	9.6	8.	4.	4.	3.5	5.8	.064	.48	.035	1.	.88
1339	Sep. 2,	"	consd.	.2	262.8	234.8	28.	20.	10.	10.	3.4	7.7	.034	.48	.000	.1	.88
1362	" 9,	"	"	m'ddy	300.	265.6	34.4	10.	10.	0.0	3.9	7.1	.074	.4	.000	.1	.72
1386	" 15,	decid.	much	"	473.6	184.4	289.2	18.	12.	6.	2.3	14.2	.072	.56	.075	.8	1.28
1401	" 22,	dist'ct	consd.	.4	381.	294.8	86.8	15.2	14.	1.2	2.6	14.6	.6	.56	.14	1.6	1.2
1431	" 29,	"	"	m'ddy	365.6	273.6	92.	12.	12.	0.0	3.5	6.1	.058	.24	.035	1.2	.56
1447	Oct. 6,	"	"	"	366.4	282.	84.4	16.	16.	0.0	4.8	6.6	.014	.32	.007	1.2	.48
1496	" 12,	"	little	.15	362.4	328.	34.4	25.2	24.	1.2	4.	4.3	.02	.16	.013	1.5	.72
1537	" 21,	"	consd.	m'ddy	348.8	317.6	31.2	14.	14.	0.0	4.	4.7	.008	.32	.005	.9	.64
1561	" 27,	"	"	.3	370.	316.	54.	42.	28.8	13.2	4.	5.5	.048	.28	.000	.5	.56
1590	Nov. 4,	decid.	much	m'ddy	468.	226.	242.	28.	22.	6.	4.6	18.	.114	.64	.013	.9	1.36
1623	" 10,	dist'ct	consd.	"	366.	296.	70.	22.	20.	2.	4.1	6.9	.09	.36	.01	1.6	.64
1643	" 18,	"	"	"	360.	330.8	29.2	21.2	16.	5.2	3.7	4.4	.04	.16	.022	1.8	.64
1666	" 25,	"	"	"	340.	316.8	23.2	50.	9.2	40.8	3.6	3.4	.016	.16	.006	2.2	.72
1684	Dec. 2,	"	little	.3	338.	324.8	13.2	34.	34.	0.0	3.8	4.1	.008	.16	.006	2.	.68
1711	" 9,	"	"	.3	342.8	338.4	4.4	26.8	26.8	0.0	4.4	4.3	.016	.18	.006	1.8	.56
1733	" 16,	"	consd.	m'ddy	297.2	292.4	4.8	28.	28.	0.0	3.3	2.7	.004	.24	.003	1.	.48
1761	" 23,	"	little	"	308.	306.4	1.6	32.8	18.	14.8	3.6	4.	.006	.16	.022	.7	.4
1779	" 30,	"	"	.2	317.6	314.4	3.2	24.	15.6	8.4	4.	4.	.016	.14	.005	1.1	.48

AVERAGES FOR THE PERIOD FROM FEBRUARY 18, 1896, TO DECEMBER 30, 1896, INCLUSIVE.

	Total.	Dissolved.	Suspended.	Loss on Ignition: Total.	Dissolved.	Suspended.	Chlorine.	Oxygen Consumed.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	Total Organic.
Average	354.4	288.7	68.	20.3	15.8	4.7	4.4	7.6	.119	.351	.04	1.63	.806
Highest	682.	378.	304.	50.	34.	40.8	23.	19.6	.9	.64	.175	6.	1.44
Lowest	241.2	184.4	1.6	6.2	4.	0.0	2.	6.1	.006	.1	.000	.1	.4

The very high chlorine in numbers 511, 526, 1,182, and 1,183 are undoubtedly caused by the backing of water from the Illinois river up Spoon river, the point of collection of the samples being about one half mile within the mouth of Spoon river.

*Blank spaces in this table are due to loss of part of the records by fire.

FINANCIAL STATEMENT.

The thirty-ninth legislative assembly appropriated five thousand dollars for "Improvements in the Chemical Laboratory," with the understanding that the work of the water, survey wpuld be provided for from this sum.

The trustees of the University accordingly assigned one thousand dollars for the genera], improvements in the laboratory, and four thousand dollars for the, water survey. Of this fund the following amounts have been expended to December 31, 1896:

Fitting up special quarters for water analysis; including partitions, floor, desire, plumbing, etc..	$929 35	
Apparatus and chemicals	613 36	
Freight and hauling	14 43	
Express charges upon water samples	252 16	
Collection of water samples	9 75	
Copying records	13 68	
Expense, A..W. Palmer	10 06	
Printing, blanks, record books, etc	58 60	
Filing cases, etc	17 95	
Postage	15 00	
Salary of assistant chemist	960.00	
		$2,894 34
Balance		1,105 66
		4,000 00

WORK OF THE SURVEY.

In conducting the investigation of the water supplies most of the work of making the analyses has fallen upon Mr. C. V. M. .Millar, assistant. chemist to the survey, to. whom much credit is due for accurate manipulation and indefatigable zeal. Several of the corps of instruction,of the department of chemistry have, in addition to their university duties, which are in /themselves no light burden, given us valuable assistance in the work of the water survey. Mr. C. R. Rose has made a number of quantitative analyses of the mineral constituents of some of. the waters and has helped us with the records. Dr. H. S. Grindley and Mr.H. Keeler have made a large number of determinatiohs of the phosphorus.(as phosphoric acid, etc;) contained in the.river and canal waters. ' Although the results of the quantitative analyses and the phosphorus determinations are not published in this preliminary report yet it is but just that our thanks be here expressed for the very efficient help accorded by these gentlemen to the general purposes of the survey.

NEEDS OF THE SURVEY.

The announcement in September, 1895, through the public press, that the Department of Chemistry of the University was prepared to make chemical analyses of potable waters for citizens of the state, brought numerous requests from various communities. Many citizens desired complete quantitative analyses of the mineral constituents of the waters, and others asked for bacteriological examinations. Except in a very few cases, it was, from press of work, impracticable for us to undertake more than the sanitary chemical analysis.

In order to make our investigations more thorough going and of greater value to the public, it is desirable that such provision for the purposes of the survey be made that the complete quantitative analysis can, when the importance of the case demands it, be effected, and the biological examinations, without which no sanitary water investigation is complete, may accompany the chemical work. Examinations of the artesian waters of the State in pariicular require that quantitative analyses of their mineral constituents be made. For such provision as is necessary for these purposes requests have already been presented.

More than half of the people of the state of Illinois, depend upon wells for their water supply, but in consequence of the flatness of the surface and the nature of the surface strata,efficient drainage is difficult, and the use of the water of the ordinary shallow well must be considered as a source of great menace to the health. Indeed the shallow well is in general regarded with suspicion by the intelligent public; but on the other hand, the somewhat disagreeable characteristics of the deep drift well waters arouse prejudice against their use, although they are far safer. It is likely that these disagreeable qualities can be modified and the waters rendered much more palatable, but the best treatment for attainment of this purpose remains still to be determined and must be the subject of experiment.

The importance of this matter to the people of the state. is such as should warrant the expenditure of time, labor, and funds. in investigation directed toward the discovery of the best and most economical means of so improving the deep drift waters that they may be made as agreeable as they are wholesome. Such investigations might well be undertaken at the University by co-laboration of the Department of Chemistry and the Department of Municipal and Sanitary Engineering.

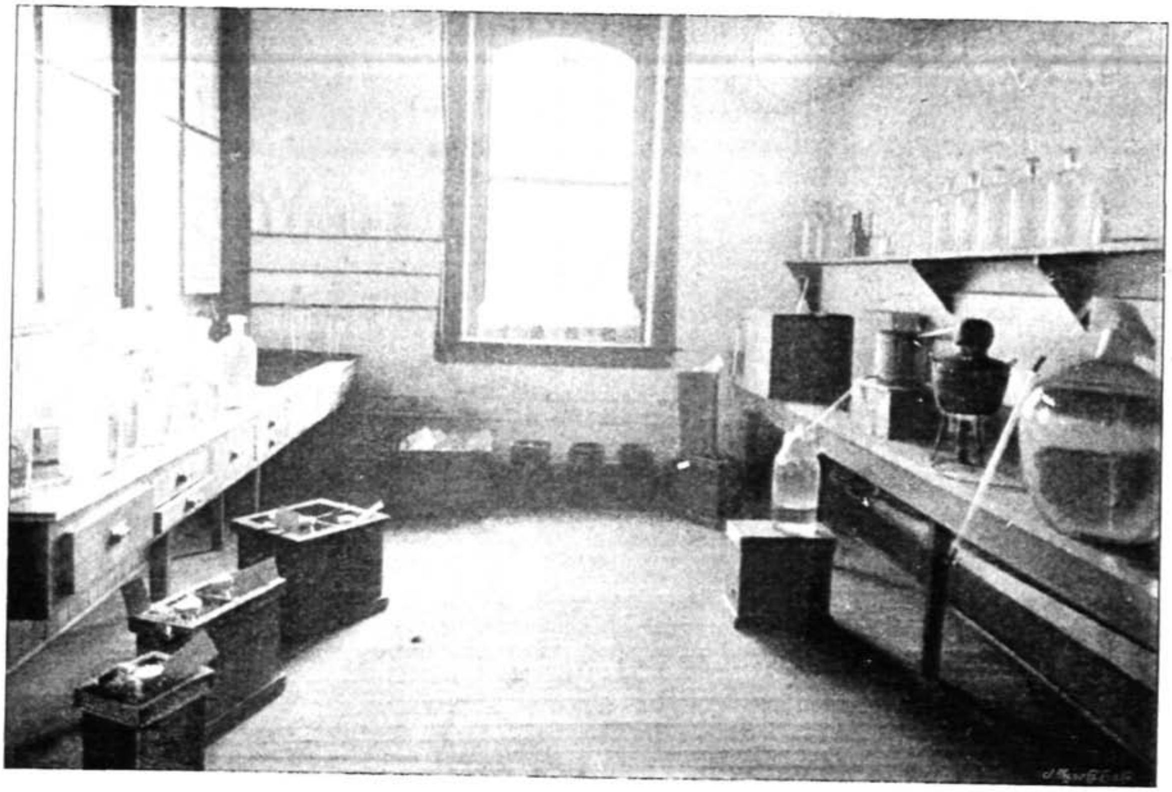
Respectfully submitted,

ARTHUR W. PALMER,

Professor of Chemistry-

January 20. 1897.

LABORATORY FOR WATER ANALYSIS.



LABORATORY FOR WATER ANALYSIS.

LABORATORY FOR WATER SURVEY.

ERRATA.

These errata do not affect the validity of the tables upon pages 48 and 40.

PAGE 28—

No. 583—Nitrogen as nitrates should read 3.25 instead ot "none."
No. 805—Nitrogen as nitrates should read 3 instead of ".3"

PAGE 29-

No. 1047 -Nitrogen as nitrates should read 7.3 instead of "72."
No. 1106—Nitrogen as nitrates should read 30. instead of ".3"
No. 765—Chlorine should read 83. instead of "6.3"

PAGE 30—

No. 503—Nitrogen as nitrates should read 3). instead of ".3"

PAGE 31—

No. 1074—Chlorine should read 87.5 instead of "875."
No. 1494—Nitrogen as nltraies should read .28, instead of "28 "
No. 1038—Chlorine should read 3 0 instead of "30."

PAGE 33—

No. 1061—Nitrogen as nitrates should read .75instead of ".95"
No. 1545—Nitrogen as nitrates should read 2.8 instead of "28"

PAGE 31—

No 1677—Chlorine should read 25. instead of "26."

PAGE 35—

No. 1505—Chlorine should read 28. instead of 20."

PAGE 36—

No. 1559—Nitrogen as nitrate should read 3 5 instead of "35"

PAGE 37—

No. 1610—Depth of well should read 1350 Instead of "13½"

PAGE 38—

No. 1737—Nitrogen as nitrates should read .5 instead of "5."
No. 747—Chlorine should read 255. instead of "2.55"

PAGE 39—

No. 815—Chlorine should read 55. instead of "65."
No. 1603—Nitrogen as nitrates should read .1 instead of ".01"
No. 094—Nitrogen as free ammonia should read 19. instead of ".19"

For analyses 443.709, and 920, instead ot the data given in the tables on pages number 38.39, and 40. respectively, read as follows:

	Number.	Residue on Evaporation.			Color on Ignition.	Chlorine.	Oxygen Consumed.	Nitrogen as			
		Total.	Loss on Ignition.	Fixed.				Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
Page 38......	433	698.	12.8	685.2	white	160.	9.	....	... .. .	.045	.44
Page 39......	709	1182.	88.	1094.	"	380.	1.	... .	.. ..	none	11 5
Page 40......	920	1650.	64.	1586.	red	1.9	1.6	.7	8	.001	.112