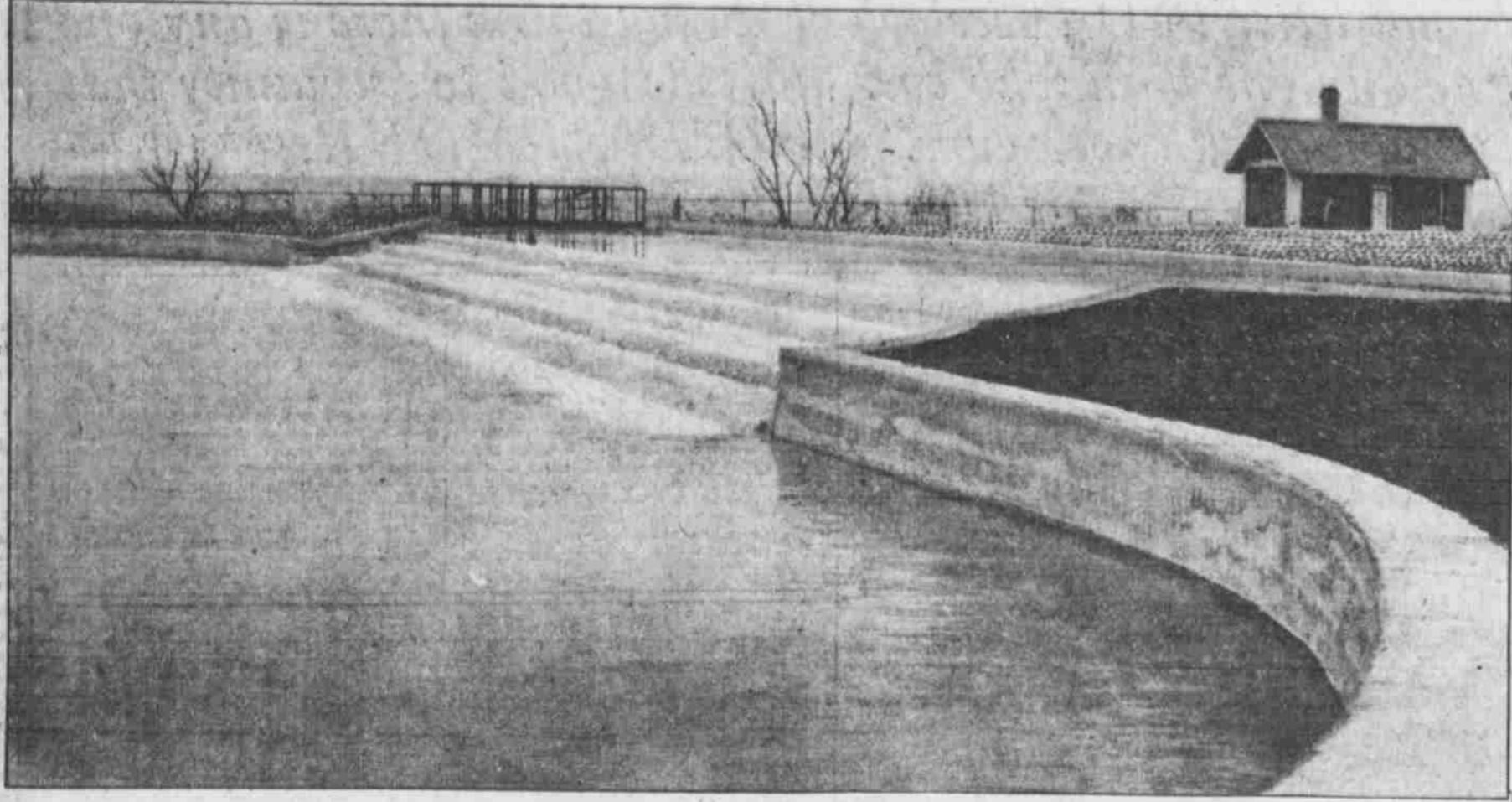
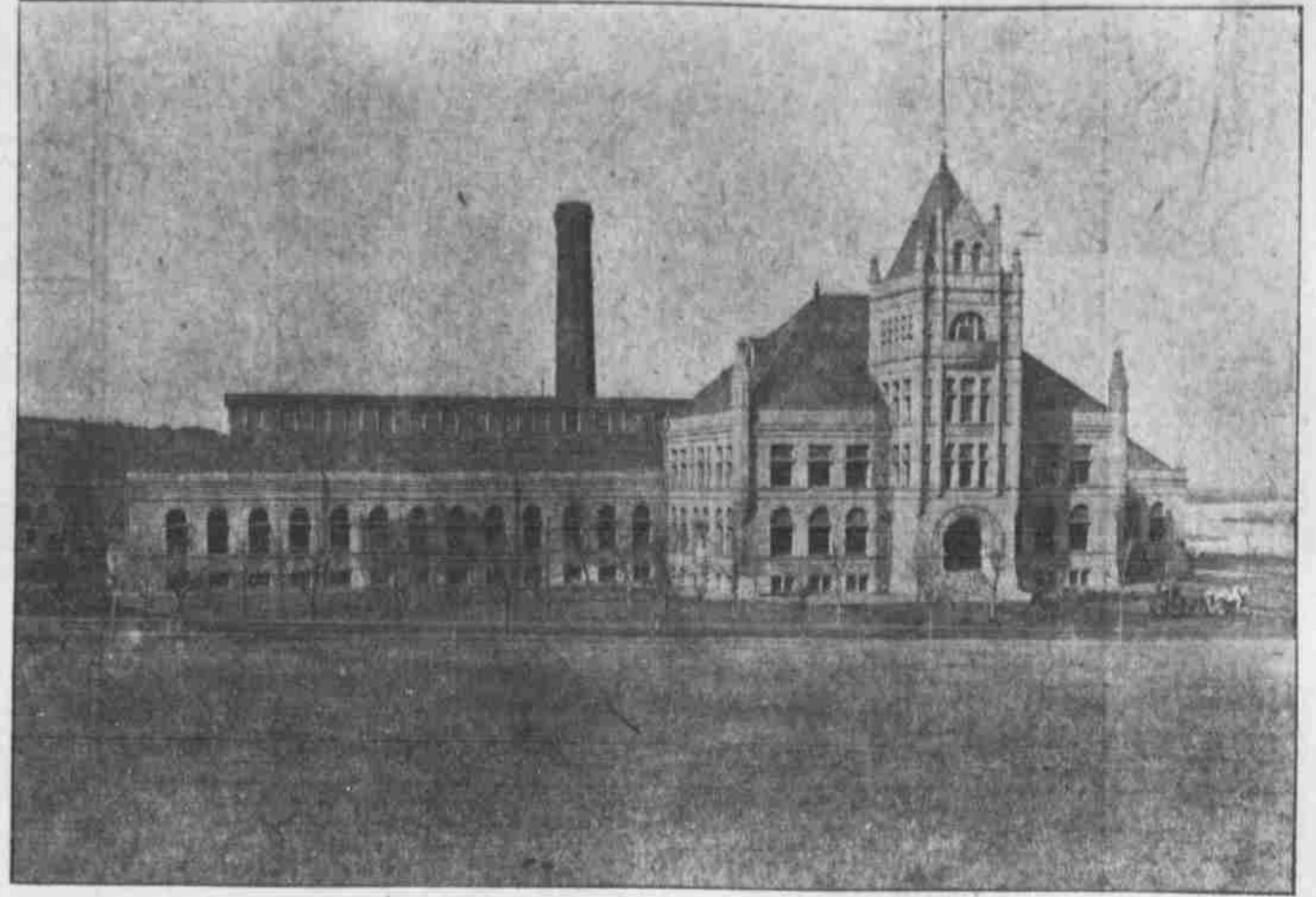


# Purity of the City's Water Supply and How It is Attained for Omaha

Some Facts About the Magnificent Minne-Lusa Pumping Plant and Service Maintained by the Omaha Water Company



ONE OF THE WEIRS OVER WHICH THE WATER RUNS IN THE PROCESS OF ITS PURIFICATION BY THE SETTLING BASINS AT THE MINNE-LUSA PLANT.



MINNE-LUSA PUMPING STATION AT FLORENCE.

**P**URE WATER for the use of the dwellers within its gates is one of the most valuable assets which any city may possess, for nothing will spread disease and sickness faster than an impure water. To provide its patrons in Omaha, South Omaha and the suburbs with pure water is the province of the Omaha Water Company, the corporation which has the privilege of furnishing the water to the people of Omaha.

People of Omaha like the Missouri river water, for they have become accustomed to it, but to the stranger within the city gates it has to be taken with a slight misgiving at first. The traveler crossing the Missouri river at Omaha for the first time gazes down at the boiling yellow stream below and is dumbfounded when told that the people of Omaha drink that water. They cannot see how such water can be used and they wonder when told that the Omaha Water company clarifies that water and the people of Omaha like it.

It is hard for those people who are accustomed to the colorless water of the West to comprehend that the water which is given to the people of Omaha through the agency of the Omaha Water company will stand an analytical test better than 99 per cent of the waters of this country. The water of the Missouri river is for most part melted snow from the mountains and the coloring matter is sand and silt which is being carried to the gulf. Instead of being a detriment to the water, this sand is a recognized purifying agency, for it turns the water and acts as a filtering agent.

**Commissioner Report Good.**

The last published report of the city health commissioner stated that "I have had an analysis of the city water made at four different times during the last year; in January, February, June and December. The water being taken from the intakes at the river, the settling basins and from faucets in the central part of the city. In each case, in the language of the bacteriologist, it is pure and wholesome and compares favorably with water anywhere in the country and is incapable of causing disease." This report is similar to one made by Prof. Vaughn, in charge of the water analysis department of the University of Michigan. When the plant was first installed many had misgivings concerning the quality of the water because of the color, and many analyses were made to satisfy the skeptical. These were uniformly the same—that Omaha had the best water for its citizens to drink.

When the water works was first installed the water was taken from the Missouri river at the practically abandoned station near Burt street. Here were several settling basins, but as the city grew they became inadequate and it was found necessary to install a new and larger plant at Florence.

A strip of 100 acres, especially adapted for a plant, was bought and the company spent a considerable sum in riprapping the river to protect the plant and to keep the ever-shifting Missouri from moving away from the power house and intakes. Nestling under a hill, almost out of sight from the inhabitants of Florence, the oldest town of Nebraska, lies Minne-Lusa station, the power plant of the Omaha Water company. No finer spot could possibly have been selected for the station as it was chosen with special reference to the peculiar kind of reservoirs which are used for clarifying and aerating the water and because it is the only point on the river where the bedrock comes near enough to the surface to make the intake perfectly secure.

**Blue Sandstone Beauty.**

A splendid pumping station was built, the building being a beauty, constructed of Missouri blue sandstone, and an immense pump was installed to carry the water to Omaha through the thirty-six-inch main. Since that first pump was installed it has been found necessary to add two large assisting pumps, and there are the wonder of the west, being immense structures, and making the station one of the show places of Omaha.

Direct pressure alone is not relied upon to give Omaha a high water pressure, but large reservoirs were built near Walnut Hill, and these give a gravity pressure which assists in case of fire. With this reserve reservoir the city of Omaha is able to call upon the Omaha Water company for 24,000,000 gallons of water in a day, the only thing standing in the way being the lack of a main large enough to deliver it.

To eliminate the sand from the water was one of the problems which confronted the builders of the Omaha system. The late Captain Frank Reynolds figured out a plan which was put in use when the Minne-Lusa plant was first built at Florence, and which has been in successful operation ever since that time.

Captain Reynolds noticed that when a glass of Missouri river water was allowed to stand for a few minutes the first part to settle was the top, and that that soon cleared, while the lower part of the glass seemed muddy. He applied this theory to the new basins.

Five giant basins were built, each exceeding basin being several feet lower than the other. The water is pumped from the river into the first basin, and by the time it reaches the last basin it is comparatively clear, because of the manner in which it is handled. A thin sheet of water is allowed to flow from the first basin over a series of steps, or weirs, to the next lower basin. If water or mud is poured from a glass or pan it will be noticed that the top of the body of liquid is the first to flow. So it is at the basin. The top, or the most settled part of the water flows over the steps into the basin below. The fall is so great that the water sprays into the air when it hits the steps and is thus aerated. Air permeates all parts of the water as it is flowing into the next basin, and so the system of removing the sediment from the water also works for its purification.

This plan is followed out from one basin to the other until the last basin is reached, when the water is ready to be forced through the mains to Omaha. This process of sending the water over the weirs has attracted world-wide attention to the Omaha plant and has been followed out in other cities. The location at Florence was especially chosen with reference to having the basins work in succession, and the wisdom of the builders has been justified because Omaha has water of which it may well be proud, the only trouble arising in the spring when the breaking up of the ice in the river aways some of the mechanism at the intake and permits the mains of Omaha to be filled with muddy water which it takes several days to remove.

**Color No Detriment.**

A stranger in Omaha, drawing water from one of the faucets, is first struck with the odd color of the water and later by the facts. The inhabitants of Omaha are brought about the first impression of other waters is that they are tasteless and have no bottom; to them the fact is the people of Omaha know they have good water and have learned to like it, and none other suits them as well.

Captain Reynolds had his idea of the settling basin patented. His plan, which was carried out in the construction of the Florence plant, was that in an apparatus for clarifying and purifying water it was best to have each basin divided into two settling chambers with valved wash pipes within the chambers so that the water enters the basin over one settling chamber and leaves above the other. Thus the sand which settles in the first chamber is not carried to the other chamber and the water is thus the better clarified.

The aerating weirs comprise a declining plane, having a series of weir boards set at an angle to the perpendicular so as to provide an air bed, each board being provided with a series of upwardly extending lips to interrupt the water flow, thus spraying it into the air. By this means the water has air above and beneath and the sheet is again broken into a spray and given further chance at aerating.

The basins at Florence are so constructed that one or all may be set at a time, or that all the water may be let out of one basin at a time and the sand and sediment in the bottom of that basin then washed into the river. The basins are all high enough above the river so the water may be drained into the river below.

**Ice Makes Trouble.**

Superintendent Hunt of the Omaha Water company reported that the trouble with the water this spring was that the ice in the river melted before the ice in the res-

GENERAL VIEW OF THE UPPER SETTLING BASINS AT THE MINNE-LUSA STATION OF THE OMAHA WATER SYSTEM.



IN THE BOILER ROOM AT THE PUMPING PLANT.

ervoirs, thus causing more trouble than was ever before experienced in that line by the company. This has never before happened in the history of the plant.

Omaha is recognized all over the country as one of the healthiest cities in the union, and a great deal of credit for this showing is given to the pure water which is furnished by the water company. In fact, it has been stated many times that although Omaha is remarkably free from the rages of typhoid fever, that disease would be practically entirely wiped out if all would use the water from the Missouri river as furnished by the water works company and stop the use of water from wells and cisterns.

When the work of installing the water works system in Omaha was begun this city had a population of 30,000 souls. Now with a population of 170,000 the needs of the city are correspondingly greater, and to provide for this increase the Omaha Water company has been forced from time to time to add to its plant. The water was first pumped from the Burt street station and carried through twenty-eight miles of mains to the users of water in the city. Three years after the first plant was installed the daily consumption of the city was 4,000,000 gallons and it was found necessary to enlarge the plant.

**Minne-Lusa a Beauty.**

The Minne-Lusa station was built at Florence, where it now stands in a well kept park, which is one of the show grounds of the city. The giant engines which force the water to Omaha are a revelation to many who have never before had an opportunity to see such huge machines in action. Although three huge pumps are used to force the water to

Omaha, but one or two are used at the same time, the other being held for an emergency. These engines are larger than most dwelling houses and excite the wonder and admiration of all who stop and look. The mileage of the mains in Omaha today is 236 and the daily consumption averages about 16,000,000 gallons. The three high service pumping engines at Florence consist of two verticle, triple-expansion Allis engines, one of 18,000,000 and the other of 20,000,000 gallon capacity and one Gas-kill pumping engine of 14,000,000 gallon capacity.

All of the water used in Omaha is pumped twice and about 40 per cent of it a third time from high-service stations. These stations are located on the higher ground of Omaha and are used to boost the water along and give better pressure in some of the higher parts of the city. The station on south Twentieth street can be used either to help the water along to South Omaha, or to alternate with Walnut Hill station, in supplying the high-service district.

**Captain Reynolds' Discovery.**

An interesting story is told of the manner in which Captain Reynolds made his discovery as to the best way to purify water and which discovery he afterwards carried out in his patents and in the construction of the Omaha settling basins. He was a sea captain and many years ago was stranded on a south sea island with his entire crew. The island was small with no running water, but there was several pools of stagnant water which had become contaminated by the presence of numerous flocks of birds. There was nothing for the sailors to do but to try to purify that water at hand, which was

done by boiling for the most part. As the sailors had plenty of time on their hands some of them whittled out some small water wheels with their jackknives and permitted the water to run from the pools over a series of rocks and over these wheels, which sprayed it into the air so that it became purified. No better purifying agency is known than air and the sun and with both these agents at work the sailors were able to purify the water which they wished to use. Captain Reynolds remembered this plan of the sailors and afterwards put it to use in such a way that it is now in daily use in cleaning the water, which the people of Omaha use for all purposes.

**Public Always Welcome.**

The public is always welcome to visit the plant of the Omaha Water company at Florence, for the officers of the company want the people of Omaha to know to what pains they go to provide wholesome and clean water for the users of water. The station is always kept in spotless condition and on a bright day is crowded with those who are interested in seeing the "wheels go round." The street car line runs to within two blocks of the Minne-Lusa station, which is thus available to those who ride in street cars, as well as to those who ride in motor cars.

Experts from all over the world have visited the system of the company and they unhesitatingly pronounce it one of the finest ever constructed anywhere. All are lavish in their praise of the fine service which it affords and the care with which the plant at Florence is maintained. The company property at Florence has the appearance of a large park, with great

lakes scattered throughout, and marmoth piles of architectural beauty rising toward the sky. The first building that strikes the eye of the visitor is the residence of the chief engineer, a handsome structure, at once combining beauty and convenience. There are also a number of pretty cottages, the homes of the company's engineers and firemen. Towering high above all is the splendid structure built to house the machinery, a structure of unrivaled architectural beauty and adapted in every way for the purposes for which it was built.

**Rooms Marvels of Beauty.**

The power house is two stories high, with a basement. It is constructed of Warrensburg, Mo., blue sandstone, and in the center of front is a splendid tower, reaching five stories high. The basement is used for boiler rooms, bathrooms, electric light plant, etc. In this is a battery of fourteen boilers, aggregating 3,000 horsepower. On the first floor are located the great engines, three high pressure, for forcing water to Omaha and three low pressure, for pumping water from the river to the reservoir.

The engine rooms are marvels of beauty, finished with as much care as a drawing room in a private residence, and are kept spotlessly clean. The ceilings are of red oak. Half way up the walls stretches the visitors' gallery, from which a fine view may be had of the giant engines in action. The entire plant is lighted from a plant in the basement. In the tower are rooms for the officers and visitors, observatories, etc.

**Intakes on Solid Rock.**

The process of taking the water from the Missouri river and delivering it from the faucets throughout the large territory covered by Omaha, South Omaha and the suburbs is most interesting. At a point where the water swings around a curve from the east and dashes full against the Florence front with all its fury the company has located what it terms its "intakes" or "inlets." These are two in number and measure 30x100 feet each, being built on the solid rock of the bottom of the river. Facing toward the center of the river, these intakes are down about twenty-two feet below the water and are protected from the swift current by a strong system of jetties which extend out into the current.

Into these inlets the muddy water of the Missouri starts on its cleansing course and finishes up in a pure state at the faucets of Omaha. It is taken from the inlets by suction through great sheets of screening into two huge wooden screens, both caulked and built water-tight like a ship. Through large iron pipes the water is then carried from these cribs through the pump house by means of the low service Allis engines and south a distance of half a mile to the farthest and highest setting basin.

The settling basins are five in number and the highest is the farthest from the pump house, so as the water flows over the weirs into each succeeding basin it finally lands in the basin nearest to the pump house, from which it is pumped through the thirty-six-inch mains to Omaha.

**Basins Like Lakes.**

In appearance these basins are as small lakes, each oblong in shape, with cement walls and grass growing around the outside. The sides of the walls are of stone, and double thick, and between the double walls is packed a strong cement grout which makes them impervious to the water. The bottoms of the basins are concrete. In the bottom of each basin are huge mud valves, and once every two weeks the basins are cleaned out. Some idea may be gained of the way in which these basins perform their work when it is stated that when cleaning day comes there is generally found as much as six feet of mud in the bottom of the basin. Giant sewers carry this mud into the river far below the intakes.

The visitor is permitted to visit all parts of the Minne-Lusa station, even to going down into the lowest basement, where the water is brought in by the low pressure pump, to be forced to the settling basins. The huge plungers moving up and down fill one with awe at their immensity.

**Boilers Are Massive.**

The engineer will tell the visitors that each of the mammoth driving wheels on the high pressure engines weighs thirty-two tons, then the stranger will wonder how such an immense weight could ever be put in place and how it could be made to move after it is in place.

A visit on to the boiler room soon removes that wonder to any with a mechanical turn of mind, for here is seen a battery of fourteen huge boilers, four new ones of 80-horsepower each having been recently installed. He is told that these boilers are able to generate 3,300 horsepower, and then he wonders more. The boilers seem odd, for they all stand on end and rise high in the air above the freight below. All the latest contrivances are used to assist the firemen in their task of handling the large amount of coal which is necessary to keep these boilers going and to remove the ashes from the pits. A spur runs from the Omaha road to the plant by which the coal is hauled in.

In summer flowers are seen on all sides, for the superintendent makes pride in making the plant as beautiful as possible, and thus giving a recreation place for the people of Florence and to those who drive or ride from Omaha for a little outing.

The Omaha Water company and the companies which have owned the plant before it have done much toward the upbuilding of Omaha. The progressiveness and enterprise which the officers have shown promise to add continually to the plant the company possesses in the city and to keep the water plant of Omaha one of the best in the world.

The company has handsome offices in The Bee building, Seventeenth and Farnam streets, and continually throughout the year 300 men are on the payroll of the company.

The officers of the company are: T. C. Woodbury, president; E. M. Fairfield, general manager; Stockton Heth, treasurer, and A. B. Hunt, superintendent.

Numerous tests have been made of the water after it comes from the last settling basin and in every instance these tests have corresponded to the nitrate of silver test of distilled water.

The analysis shows well in comparison with other cities in both this country and Europe. On the continent the population is much more dense than in the United States and therefore more attention has to be paid to the water which is used.

In the column of "oxygen consumed in most combustion" Omaha shows up very favorably in comparison with the London water, and especially well in comparison with the water used in Boston.

The Missouri river water has a large percentage of solids, but no analysis has ever been made to separate the soluble solids from the suspended solids. Charles F. Crowley, water analysis expert, has made several tests with Omaha water and he has repeatedly pronounced it good. He "distilled" water and "good" water. "A small quantity of solids is not a detriment, but a good thing for water," said Mr. Crowley. "No one wants to drink distilled water."

**Comparative Analysis of City Water**

Description.	Solids.	Chlorine.	Free Ammonia.	Oxygen consumed in moist.	
				per Albu. min.	per 100 gal.
City water	48.6	10.0	.06	.08	2.00
London water supply (Thames)	264.0	17.9	.20	.26	2.34
London water supply (New River)	223.0	16.0	.20	.26	2.34
London water supply (Kent company)	361.0	30.0	.05	.07	4.45
Boston	164.4	1.1	.05	.07	4.23
Washington	165.0	1.1	.05	.07	4.23