to adjust at the orifice the dose of chemical solution with a great degree of accuracy in a moment's time.

The bleaching powder was received at the plant in sheet-iron drums holding about 750 pounds, net. This powder was of a high degree of purity as ascertained by frequent analyses of it during the period of operation mentioned. Ordinarily the powder ran about 35 per cent. in "available chlorine," equivalent to 7.9 per cent. available oxygen. For the majority of the time solutions of 1 per cent. strength were used. For a part of the time, as is the case now, ½ per cent. solutions were used. By a ½ per cent. solution is meant the addition of 5 pounds of dry bleaching powder to each 1,000 pounds of water.

In making up a solution the amount of old solution remaining in the tank was first ascertained from the depth recorder and then it was decided to what height the tank was to be filled. By referring to the proper table showing the capacity of the tank between these two gauge readings it was then possible to figure the amount of dry bleaching powder necessary to add to make up a solution of the desired strength. This amount of dry powder was then dumped into the dissolving compartment of the mixing tank, raw water turned on, and the agitators started. The solution rising in the dissolving compartment overflowed into the main solution tank, which was filled to the required height through this overflow.

When it was desired to throw a tank into use the proper valves were opened, connecting the suction in this tank with the chemical feed pumps. The solution was tested by the Penot method for its strength in available oxygen by the so-called "available chlorine" method and the orifice on the orifice tank adjusted to give the required dose.

The chemical feed pumps were always operated so as to pump a quantity slightly in excess of that discharging through the orifice, and this excess escaped from the tank through an overflow pipe leading back into the main solution tank. In this manner it was possible to maintain at all times a constant head over the orifice and if, for any reason, the feed pumps stopped, the level of the solution in the orifice tank immediately began to fall, causing an alarm to be rung notifying the operator of the fact. Very little trouble was experienced from clogging at the orifice, and the variation in rate of application of the chemical solution was, therefore, exceedingly slight, but practically negligible.

In the beginning, not having a thoroughly definite idea of the smallest quantities which could be used with satisfactory results, the amount of chemical applied was 1.4 parts per million of "available chlorine," corresponding to 0.3 part per million of potential oxygen, or 36 pounds of dry bleaching powder per million gallons of water treated. Gradually the quantity of applied chemical has been decreased until at the present time about 0.2 part per million "availab'e chlorine" is being applied. This corresponds to 0.045 part per million of potential oxygen, or 5 pounds per million gallons of the bleaching powder.

There has been no striking evidence that the higher quantities were more efficacious in the destruction of bacterial life in the raw reservoir water than the small quantity last mentioned. The composition and temperature of the raw water apparently affected not at all the rapidity and completeness of the sterilizing action.

A long series of analyses were made with a view to establishing if possible a relationship between the amount of carbonaceous organic matter in the raw water and the amount of sterilizing agent necessary to effect the desired degree of sterilization. The quantities of the steriliz'ng agent used were so small, however, that there was found to be no such relationship existing. In other places, where the amount of organic matter is much higher than in the raw Boonton water, it is possible that such a relationship may be found to exist.

Records were tabulated showing the amount of water treated each day, the amount of chemical agent applied, expressed in parts per million of potential oxygen, the results of analyses of the raw and treated water, and of tests for B. coli communis carried on at Boonton and in the laboratories of Drs. Park and McLaughlin.

If there is an apparent disparity in the results of analyses of the treated water at the Romine gate house and at the point of delivery in Jersey City, 23 miles below, and if the numbers of bacteria at the latter point were higher than those at the Romine gate house, as they sometimes were, it shows either that bacteria were still being washed from the old deposits in the conduit, or that there was a slight multiplication among the harmless forms of bacteria which successfully resisted the treatment. The completeness of the sterilizing action, so far as the destruction of objectionable forms is concerned, is apparent from the results. From October 10th to December 31st, inclusive, the total number of bacteria in the treated water at the point of delivery in Jersey City averaged 15 per cubic centimeter, and only on one occasion out of 455 tests was B. coli positively isolated from the treated water at the point of delivery in Jersey City, namely, on November 1st, 1908, when it was isolated by Dr. Park in 5 cc. of treated water collected at the Summit Avenue gate house in Jersey City.

Some time after the sterilization plant was put into service studies were inaugurated to demonstrate the efficiency of electrolytically-prepared hypochlorite of sodium. An electrolyzer was obtained from the National Laundry Machinery Company, of Dayton, Ohio, and this machine was set up in the gate house at Boonton and studies began. This electrolytic cell is of porcelain-lined pottery clay containing carbon electrodes and glass and carbon baffles. A solution of common salt of about 4.5 per cent. strength and having an initial temperature of about 65 deg. Fahrenheit was run through this cell at a rate of about 2 cubic feet per hour in the presence of a direct electric current of 110 volts and 22 amperes. The yield of a single cell was about 0.6 pound of available chlorine per hour.

Between the dates of March 20th and 24th, 1909, a comparative test was made on the raw water to determine the relative efficiency of hypochlorite of lime in the form of bleaching powder and sodium hypochlorite electrolytically prepared. A considerable number of determinations of the bacterial quality of the raw and treated water before, during and after the use of the sodium hypochlorite solution showed that when equal quantities of the germicide in these two forms were added to the raw reservoir water the efficiency, so far as the destruction of bacterial life was concerned, was the same.

Under the existing circumstances the total cost which can be charged against the process when using bleaching powder was found to be $0.14 per million gallons of water treated, this figure being divided up substantially as follows, basing the figures on an average daily treatment of 40,000,000 gallons of water:—

One extra operator	$0.065
Bleaching powder	0.065
Coal for heating the plant, miscellaneous laboratory and other supplies	0.010
	$0.14

It may be well to point out that power costs nothing at this plant for the reason that it is obtained from a water wheel actuated by the water flowing through the pipes which deliver the water from the dam to the aqueduct leading to Jersey City.

With power costing nothing, the charge for electric current in this process is nil. It has been found that to produce a pound of available chlorine in the electrolytic cell requires about 8.5 pounds of common salt. This salt, delivered at the plant costs about one-third of a cent per pound; therefore, the cost for salt amounts to 4¼ cents per 1,000,000 gallons of water treated. The other figures previously given remain the same, making the total cost by the electrolytic process 11¾ cents per 1,000,000 gallons of water treated. In