

USE OF LIQUID CHLORINE AT PHILADELPHIA AND OTHER PLACES.

THE Torresdale intake of the Philadelphia waterworks is in the Delaware River, about 12 miles above the business centre of the city. A review of the results obtained by the filter plant, which has now been in operation at Torresdale for nearly seven years, was given in a paper read by Francis D. West, chemist in charge of the Torresdale Laboratory, and J. S. V. Siddons, superintendent of the filters, before the New England Waterworks Association at its annual convention in September last. The paper contained a general summary of the results obtained with the use of calcium hypochlorite at hand, viz., the results obtained with liquid chlorine, the following information respecting the former process is given:

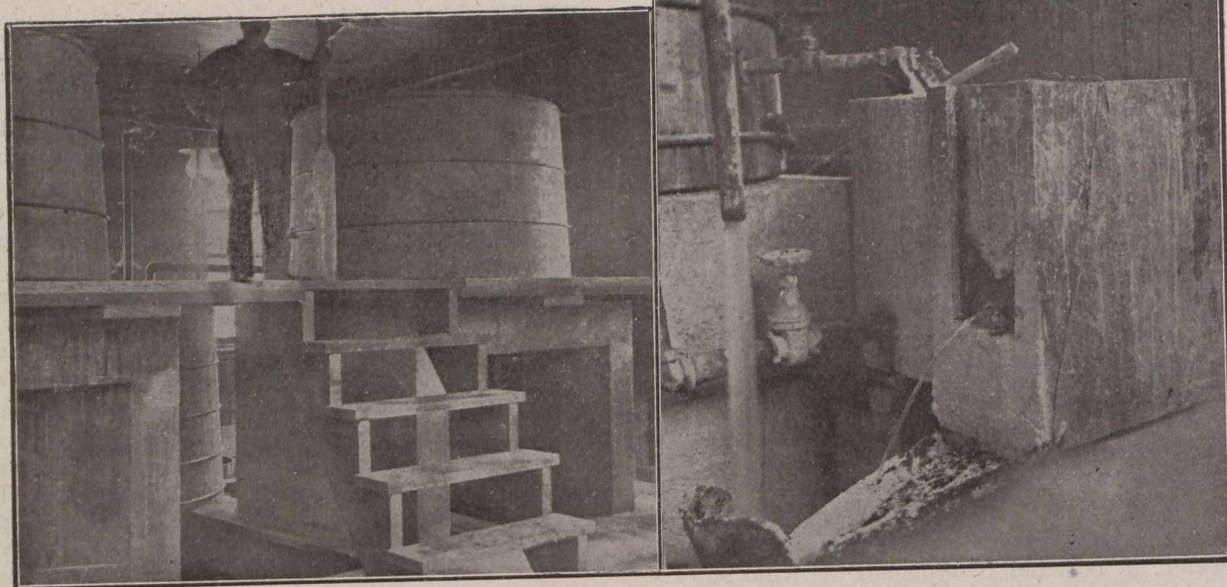
Bleach was first used at Torresdale in the form of hypochlorite of soda produced electrolytically, during September, 1909. Two cells manufactured by the National Laundry Company were used. A current of 35 amperes at 110 volts was used to decompose a brine solution. The temperature of the bleach solution averaged

The bleach plant at first consisted of two cedar mixing tanks about 5 ft. in diameter and 4 ft. deep, and one solution tank of the same dimensions, together with a yellow pine orifice tank 2 ft. to a side, which was soon changed to a concrete tank of the same dimensions. After five months' continual service the tanks became so badly perforated that they could no longer be used and were replaced by new tanks lined with 3 in. of concrete.

Fig. 1 shows the mixing and solution tanks and Fig. 2 the orifice tank. Mixing was done by hand, each mix receiving about 2 hours' agitation. From two to six mixes were made a day.

For further details respecting the operation of the plant the reader is referred to the paper mentioned above.

In another paper presented at the recent convention of the American Waterworks Association, Mr. West deals in detail with the use of liquid chlorine. In the course of his paper he presents the following objections to the use of hypochlorite of calcium and the method by which it was applied at the Torresdale filters:



Views of Torresdale Bleach Plant. Fig. 1 (left)—Mixing and Solution Tanks. Fig. 2 (right)—Orifice Tank.

110 deg. F. The chlorine and the soda were allowed to recombine, and the temperature was so high that chlorates were formed.

The bleach was applied directly in front of the inlet valve of one of the pre-filters operated at a 20-million-gallon rate, or one-fourth normal. The conclusions were, in part, that the bacterial efficiency of the filter was considerably less than that of filters operated at four times the rate without treatment.

Hypochlorite was again used in December, 1910. Due to the fact that the bacterial efficiency of slow sand filters decreases materially in cold weather, and the faecal organism, *B. coli communis*, was present in the filtered water, it was decided to use chloride of lime to disinfect the water in the filtered water basin. Treatment was continued until April, 1911, and stopped until December, when it was again started and used without interruption until February, 1913.

(1) Variation in the strength of solution, due to variable quantities of available chlorine in the powder, and to the variation in the readiness with which the bleach mixes with water.

(2) Interruption to feed of solution, caused by corrosion of orifice or stopping of flow by lumps of sludge or choking of delivery pipe.

(3) Tastes and odors which create in all probability the most serious objection.

Historical Sketch of the Use of Liquid Chlorine in United States.—The credit for the introduction of liquid chlorine for water disinfection belongs to Major C. R. Darnell, who first tried it in June, 1910. He applied the chlorine in the form of a dry gas to the water to be treated. He later carried out a series of tests with an apparatus with a capacity of 500 gal. per hour.

In June, 1912, Dr. Geo. Ornstein constructed an experimental apparatus for the use of chlorine gas for water