The effluent passed to a secondary settling tank, from which it passed to the sewer.

Operation of this unit in 1914, after some preliminary experiments, gave the following result:—

Table 1.—Tank Aerator Operation on Continuous Flow Plan.

Average results for June, July, August and September, 1914.
Part per million, except as otherwise designated)

Period of retention in tank aerator, 24 hours; amount of crude sewage treated in 24 hours, 16,000 gallons; air applied, 2.3 cu. ft. per gallon. Settlement period in tank No. 1, 3 hours 12 minutes.

	Crude Sewage	Tank Aerator	Settling Tank No. 1
Settling matter (c.c. per liter) ..	2.3	5.4	0.2
Total suspended solids	164.	103.	40.
Volatile suspended solids	130.	79.	30.
Total oxygen consumed	58.	39.	26.
Dissolved oxygen consumed ...	37.	27.	22.
Total dissolved oxygen	1.4	3.1	1.1
Dissolved oxygen demand	191.	55.	31.
Relative stability (percentage)			
Undiluted	2.	43.	84.
Diluted 1-10 with distilled water	35.	94.	100.

On October 1st, the quantity of air was reduced one-half, and under this condition, the relative stability of the undiluted effluent fell to 59 per cent.

The stability percentage is based on the ratio of available oxygen to oxygen required to produce complete stability at 20° C. in 20 days. The method is that advocated by Prof. Earle B. Phelps.

In March, 1915, some slight changes having been made in the tank, operation was started on the activated sludge method, on the fill and draw plan of operation. The accumulation of sludge was sufficient by the middle of May, but regular operation, under test conditions, was not started until June 1st.

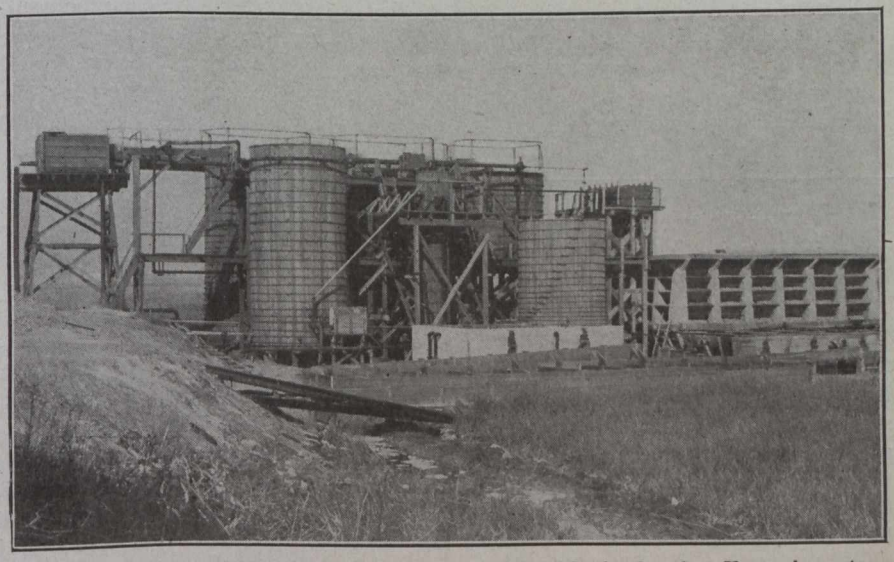
The cycle began with a period of sedimentation of about one hour, during which air was shut off, followed by a period of discharge of 1½ hours. Refilling the tank then began and air was turned on. This continued 1½ hours; aeration was then continued until the cycle began again, a period of aeration of 20 hours. Air was measured by a Venturi meter. Both influent and effluent sewages were measured.

As will be seen by the accompanying Table 2, a good effluent was obtained on the fill and draw method, after 5 hours' aeration, with 7 volumes of air per volume of sewage. This may be compared with the work of the tank aerator in 1914, under the continuous flow method of aeration, in which the activated sludge was not retained in the tank, with about 9 volumes of air and 24 hours' aeration, and also with about 18 volumes of air in the same period of aeration.

Experiments were also successfully made with the continuous flow plan of operation, but the character of the results was about the same as shown by the foregoing table, on an eight-hour retention period. These experiments have not yet been completed and are in progress.

During the present year the object has been to remove the sludge-forming materials from the sewage by means of tanks, or by screening before treatment, and to see if the sludge itself cannot be activated; also, how much it can be reduced by continued aeration. A series of tanks seems necessary for this, and it seems possible to reduce materially the volume of the sludge by aeration, accompanied by a constant removal of free water. This work has been much interrupted by the need of repairs to tanks and power plant, our plant now having been operated three years, and having been only a temporary structure in the beginning. Another year's work will probably be necessary, and extensive repairs, in order that we may complete our activated sludge experiments now projected. We have found that our Riensch-Wurl screens, with the coarse aperture 5/64 of an inch, are too fine to use before activation; probably ⅛ in. would be fine enough, and ¼ in. might be better.

Besides the data obtained at the Brooklyn Sewage Experiment Station, the author has been able to secure recent information from nearly all of the principal plants doing experimental work on activated sludge. The Lawrence, Mass., Experiment Station reports that it is continuing the work originally started several years ago with the Lawrence aerating tank, and is studying activated sludge. Mr. H. W. Clark, chemist and director, states



View from the South. (a) Aerating Tank Used in Activation Experiments; (b) Settling Tank Used in Activation Experiments.

The tank for re-activating sludge is hidden by the aerating tank. In the foreground, are the secondary settling tanks.

that both methods give stable effluents, generally speaking, the Lawrence tank method requiring generally more time but less air, the activated sludge effluent being the clearer of the two. He considers that the governing factors in the success of the activated sludge process are: cost of power for supplying the air, and a sewage that readily yields to the treatment; and concludes that it is not impossible that certain sewages cannot be purified in this manner.

The plant at Cleveland, Ohio, was designed to treat one million gallons of sewage per day, with two hours' aeration of the sewage and about two hours of the settled out sludge, before its return to the entering sewage. The experimental work at this plant, while of great interest, has not yet reached a proper stage for publication. Air is supplied with porous plates, which, the author understands, have been fairly satisfactory. Experiments are being made with aeration for the further reduction of the surplus sludge that seem very promising.