

amount of sewage entering the river from Pembroke to Ottawa is comparatively slight. Only three of the municipalities through this stretch of the river have municipal sewers and their combined population is not over 15,000. The three towns disposing of raw sewage into the river are Pembroke and Arnprior on the Ontario side, and Alymer on the Quebec side. Samples taken a short distance below their sewer outlets showed signs of pollution, but this gradually disappeared, due to the natural purification of the stream.

At Pembroke, Ont., the sewage is carried up stream by eddies and the wind, so that the municipal water is polluted. This pollution was responsible for an epidemic of 400 cases of typhoid fever at Pembroke last year. At present, the Pembroke supply is being temporarily purified by the use of calcium hypochlorite, but it is the intention of the municipality to install a filter plant.

Above Ottawa, the Ottawa river has a fairly low germ content, the color is high and the total hardness and alkalinity is low.

The Ottawa river has a maximum discharge of 250,000 cubic feet per second and a minimum discharge of 17,500 cubic feet per second. With this large volume of water and the comparatively small amount of sewage which enters the river above Ottawa one would expect to find the river in an unpolluted state. The population from Pembroke to Ottawa is sparse and the small municipalities do not dispose of their sewage directly into the river. Naturally, some pollution enters the river from these small municipalities, due to runoff and seepage, but it is very small in volume.

Aylmer and Hull on the Quebec side and Ottawa on the Ontario side, are situated within a radius of seven or eight miles and have a total population of nearly 100,000. All of these cities have sewers emptying into the Ottawa river and it is to be expected that the quality of the river water would be affected.

As the total population of the Ottawa river watershed is about 475,000, the population of Aylmer, Hull and Ottawa is more than one-fifth of the total population. As only about 15,000 of the remaining population of the entire watershed have sewer outlet into the Ottawa river it is evident that the bulk of the pollution occurs at Ottawa and vicinity. Samples were taken from Ottawa to Montreal, and they show a considerable increase in germ content over those taken from the Ottawa river from Pembroke to Ottawa. *Bacillus Coli*, the microbe normally present in the intestines of man and animals, was more prevalent in these latter samples. The chlorine content of the Ottawa river increases below Ottawa, this increase being most probably due to the raw sewage which enters the river. Sewage is high in chlorine, and when introduced into a stream of water it raises the chlorine content of that stream.

The conclusions drawn from this preliminary survey is that the Ottawa river above Ottawa is very slightly polluted because of the sparse population and the relative small amount of raw sewage directly entering the river. The Ottawa river below Ottawa shows signs of pollution because of the volume of sewage entering the river at that point. A natural purification is noted from Ottawa to Montreal, that is, the bacterial content of the river gradually diminishes as the distance from Ottawa becomes greater.

The discharge of the Ottawa river during the month of June is higher than the average discharge of the river, the maximum discharge being in May, the average discharge being in July and the minimum discharge being in September.

It is intended to continue the work on the Ottawa river during the low water stage, because at that time the pollution should be the greatest, due to the lower dilution of the sewage entering the river. By working on this river at different seasons of the year, data will be secured which will complete the work and make the whole intelligent. This work will be of value to all the municipalities situated on the Ottawa river for from it they can secure a very intelligent knowledge of the river near their respective municipalities.

The population of the Ottawa river watershed is increasing and will be much greater in ten or twenty years than it is now. With the increased population the pollution will correspondingly increase, unless measures are taken to lessen it. The work done on the river at this time will serve as valuable comparative data for any work which is done on the river in the future.

#### Filtration Plants.

The work on the water purification plants in this Province has mainly been confined to Verdun and Longueuil, but it is intended to extend the work to all the purification plants in the Province.

Verdun secures its supply from the St. Lawrence river and secures mixed Ottawa and St. Lawrence river water. The intake extends into the river 1,000 feet and secures a water which is practically free from shore wash.

Verdun has a population of 10,000 and has a daily consumption of about 350,000 gallons of water. Two one-half million gallons mechanical pressure filters are installed to filter the water for the municipality. The coagulant is introduced into the pump suction, and the treated water is pumped to the filters. The filters have sand beds three and one-half feet thick through which the water passes before entering the service mains of the municipality. At the beginning of the work on this plant a good bacterial removal was being secured but the color present in the raw water was not being removed. It was found that the color could be removed by using three grains of alum or two grains per gallon of sulphate of alumina. As sulphate of alumina is the cheaper, it was used in place of the alum and, when properly used, it effects a very good bacterial and color removal. During the typhoid epidemic in Montreal, Verdun did not have a single case of typhoid, although the water supply of both municipalities is practically the same, the Montreal supply being unfiltered and the Verdun supply being filtered. A single instance of the value of this inspection and analytical work in connection with the purification plant was shown at Verdun. The sulphate of alumina purchased by Verdun was about 25 per cent. below strength. This weak chemical cost as much as the stronger article and requires more to do the work. From now on Verdun will buy its sulphate of alumina under specifications furnished by the Board and in this way they will be assured of high-grade article.

Longueuil has a population of about 4,000 and a water consumption of about 325,000 gallons daily.

The supply is taken from the St. Lawrence river and after being treated with alum is filtered through two pressure filters, having a combined capacity of 400,000 gallons per day. The St. Lawrence water is clear and low in color during the major portion of the year, and because of this fact it has been the practice at Longueuil to only use alum the short period during the year when the water is turbid. During the remainder of the year, the water is filtered without the use of a coagulant. As a mechanical filter is not designed to be used without a coagulant the results secured