

general solution will be better correlated along similar lines.

**Guiding Principles in Control of Pollution.**

The following general principles should guide in the formulation of regulations for the control of pollution in the boundary waters in its international aspects:

1. The boundary waters shall not be polluted on either side to the injury of health or property upon the other.
2. In the case of the boundary rivers the interests of the two countries are so closely bound together as to be mutual and the quality of the streams as a whole shall be considered in determining upon limits of permissible pollution.
3. The limit of permissible bacterial pollution shall be deemed to have been exceeded when the effective dilution as hereinafter defined shall be less than 4 cubic

feet to reduce the net bacterial pollution to a basis of an effective dilution of 4 second-feet per capita, as defined.

6. Sewage treatment, while based primarily upon bacterial pollution, shall also include the removal of suspended solids capable of settling to approximately the same degree as is called for in the case of bacteria; provided that this requirement shall not be extended to an unreasonable degree in the light of good engineering practice; and provided further, that in the case of combined sewer systems, ordinary mineral detritus shall be excluded in computing the degree of removal.

7. In all cases where sewage treatment to a specified degree is demanded, the entire contributory population shall be dealt with upon the same basis of relative improvement required, so that the net residual pollution from each community shall be proportional to its population; provided, however, that where the factor of self-purification is an element in the degree of pollution at any point the population above shall be reduced to equivalent population at that point by the self-purification factor, and the burden of responsibility shall be apportioned in terms of these equivalent populations.

8. Steamboats which pass by waterworks' intakes shall be regarded as being capable of discharging sewage in the near vicinity of those intakes without appreciable dilution. The application of the rule leads in this case to a complete bacterial purification or sterilization before discharge. Equivalent removal of solids capable of settling will not be required in the case of steamboats.

9. No garbage, city waste, offal, or other like material capable of polluting or rendering offensive the waters shall be deposited in the boundary rivers, or in such places as will permit their reaching these rivers.

[Prof. Phelps states that the administrative control of boundary water pollution is obviously a federal rather than a state or provincial matter. It is recommended that the federal health authorities of the United States and Canadian governments would naturally and logically constitute, or nominate, a joint administrative body for the direct enforcement of a continuing policy of stream protection. In the matter of cost of the improvements proposed it is assumed that the burden of responsibility is individual and to be borne equally per capita by all concerned.]

In order to discover how well the train-operating rules and signals were being obeyed on the Pennsylvania Railroad system, considerably more than four million tests and observations, covering the work of both officials and employees, were carried out during last year. The results, which have just been compiled, show that only one error occurred in every 1,110 trials, or that the working in this respect was 99.9 per cent. of absolute perfection. In four classes of tests, including the most important test of obedience to various "stop" signals, no failure on the part of any employee occurred throughout the year. An exceptionally good record was also made in the observance of rules especially intended for the protection of employees. In connection with the moving of trains 68,941 observations were made and 17 errors recorded, while with regard to the safety rules for track workmen the 342,991 tests made showed only 73 cases in which the rules were disregarded in any way. Failures strictly to observe the rules governing watchmen stationed at grade crossings occurred on only eight occasions, though 62,934 observations were made. The attention given to the matter of safety regulations is doubtless largely responsible for the fact, that last year was the third in succession in which no passenger has been killed in a train accident on the system east of Pittsburgh and Erie. Accidents to employees also continue to show a highly satisfactory diminution in numbers; those occurring last year were 11 per cent. less than in the previous year.

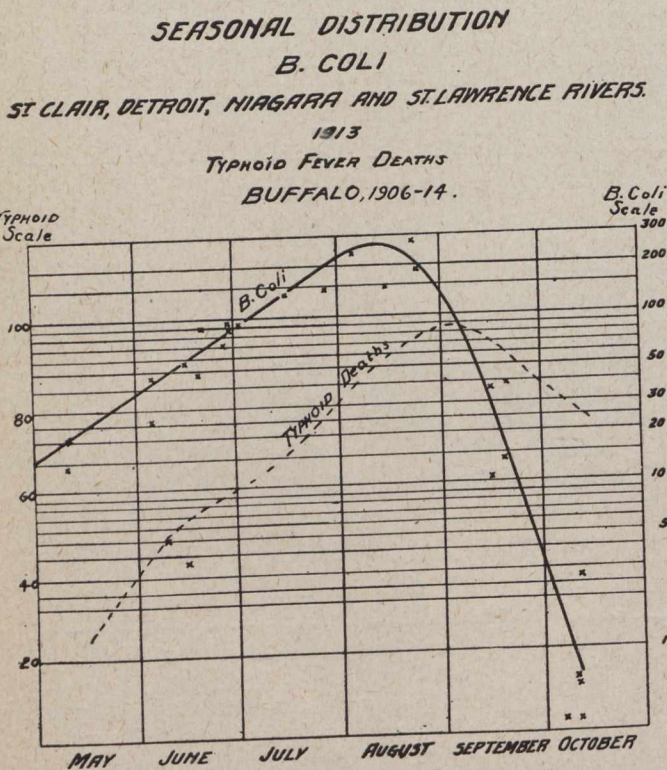


Fig. 3.—“There is an agreement between these curves that is more than mere co-incidence.”

feet per second per capita of contributing population, based upon mean river stages during the season May to September, inclusive.

4. The effective dilution shall be taken as the quotient of the actual physical dilution divided by the residual fraction of the total bacteria remaining after treatment, provided that in the case of the St. Lawrence and other rivers where the time element is such as to permit some degree of self-purification between points of successive pollution, this factor shall be considered as an element of treatment entering the determination of effective dilution at the lower point.

5. In all cases where the actual stream flow below any one point of pollution is less than 4 cubic feet per second per capita of contributing population, or where the net effect of successive pollution with proper allowance for self-purification in the intermediate stretches exceeds the equivalent of one contributing person per 4 cubic feet per second of stream flow, sewage treatment shall be em-